

## NAVAL MEDICAL RESEARCH AND DEVELOPMENT COMMAND



## 1996 COMMAND HISTORY

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## **Mission**

- Our mission is to provide timely solutions to Navy and Marine Corps medical and operational problems through biomedical research, development, test, and evaluation.

## **Vision**

- We will be an unparalleled provider of biomedical research products and services to the Navy.
- We will be recognized by senior Navy leadership and the operational forces as a vital and integral Navy asset during peace and war.
- We will maintain a world-class scientific program and will be regarded by national and international biomedical research communities as a vital international resource setting the standard for excellence in biomedical research.
- We will each be empowered members of our multi-disciplinary biomedical research team and will continually strive to enhance our value to the Navy and our contributions to the health care of our Nation.

## **Guiding Principles**

- We will view people as our most valuable resource.
- We will keep our programs focused on current and anticipated Navy and Marine Corps needs.
- We will communicate proactively with our customers on requirements, planning, and execution and will solicit their feedback on all aspects of our service.
- We will foster vigorous staff participation in identifying, advocating, planning, and executing our programs.
- We will encourage collaboration with other Department of Defense organizations, government laboratories, universities, and industry.
- We will continually develop and use new technologies in our programs and will take every opportunity for technology transfer and dual-use.
- We will nurture a creative research and development environment that encourages the free exchange of ideas, the highest ethical values, and the professional growth of our people.
- We will establish a climate of trust and teamwork.
- We will be committed to strong, competent scientific management and leadership.
- We will continuously improve all aspects of our enterprise.

## Commanding Officer



### **CAPT Thomas N. Jones, MSC, USN**

Captain Jones graduated in 1962 from Louisiana Polytechnic Institute with a B.A. degree in psychology and personnel management. In 1976 he earned an M.A. degree in experimental psychology from Baylor University. He received a direct commission in the U.S. Navy in December 1967. Following a six-month Aviation Training Program for Medical Service Corps officers at the School of Aviation Medicine, Naval Aerospace Medical Institute in Pensacola, FL, CAPT Jones was designated, in June 1968, as a Naval Aerospace Experimental Psychologist.

Captain Jones' first assignment was as Head of Training Research for the Chief of Naval Air Training in Memphis (1969 - 1971) where he was a part of the Navy's first research and development effort to integrate computer technology into technical training systems. He was then transferred to the Naval Air Systems Command (Material Acquisition (Air-05)) where he served as a Human Factors Officer of crew station design for F-14/P-3/TACCMO weapons system (1971 - 1973). He then had tours at the Naval Aerospace Medical Institute and the Naval Aerospace Medical Research Laboratory at NAS Pensacola, FL (1973 - 1977). During these tours, he served as Laboratory Coordinator for applied human performance research and aviation selection in air combat maneuvers for the Air Combat Maneuvering Range Training, NAS Miramar, San Diego, CA. During the period from 1977 - 1979 he earned his Ph.D. from the University of South Dakota in experimental/human factors psychology with a focus on modeling and simulation.

From 1979 - 1982 he served as Head of Human Factors Engineering for the Computer Software Directorate at the Pacific Missile Test Center in Point Mugu, CA. Then, from 1982 - 1985, Captain Jones was Program Manager for the Navy's Human Factors Engineering and Training and Simulation Technology Programs at the Naval Air Systems Command (Research & Technology (Air-03)). Captain Jones then transferred to the Office of Naval Research in Arlington, VA, where he served from 1985 - 1988 as Deputy Director of Applied Research and as Program Manager for Biomedical Research. At the Naval Medical Research and Development Command, Bethesda, MD (1988 - 1991), Captain Jones was Research Area Manager of the Aviation Medicine and Human Performance Programs and Specialty Advisor to the Surgeon General for Aerospace Experimental Psychology. Captain Jones' most recent assignment has been as Commanding Officer, Naval Health Research Center, San Diego, CA.

Significant professional experience includes staff consultant to the Navy's Revolution-at-Sea Program; member, Training Committee and the Tri-Service Aeromedical Research Panel (TARP); NMRDC Technical Representative to the Joint Technical Coordinating Group of the Armed Services Biomedical Research Evaluation and Management (ASBREM) Committee for Human Systems Technology; and consultant to the Chief, Bureau of Medicine and Surgery on Navy and Marine Corps aviation selection matters. Captain Jones served as Co-chairman of the North Atlantic Treaty Organization/Advisory Group for Aerospace Research and Development (NATO/AGARD) Working Group-15 (Tactical Mission Planning Systems), and as the U.S. Navy representative to the Aerospace Medical Panel of the NATO/AGARD.

Captain Jones' decorations include the Legion of Merit, the Meritorious Service Medal (gold star in lieu of second award), the Navy Commendation Medal, the National Defense Medal with bronze star, and a Navy Unit Commendation. His associations with professional and service organizations have included the Aerospace Medical Association, Human Factors Society, and the American Psychology Association. He is an active member of the scientific community and has made numerous presentations at Armed Services professional and international meetings.

Captain Jones has two daughters, Kayla D. Jones and Susan M. Smith.

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**NMRDC  
Commanding  
Officers**

CAPT T.N. Jones, MSC, USN	1994 - present
CAPT E.T. Flynn, MC, USN	1991 - 1994
CAPT J.N. Woody, MC, USN	1988 - 1991
CAPT W.M. Houk, MC, USN	1985 - 1988
CAPT J.F. Kelly, DC, USN	1980 - 1985
CAPT J.D. Bloom, MC, USN	1977 - 1980
CAPT E. Brodine, MC, USN	1974 - 1977

## BACKGROUND

Naval Medical Research and Development Command  
Building 1, Tower 12  
8901 Wisconsin Avenue  
Bethesda, Maryland 20889-5606

Key Personnel		
Code	Title	Name
00	Commanding Officer	T.N. Jones, CAPT, MSC, USN
09	Executive Officer	T.J. Singer, CAPT, MSC, USN
00A	Command Master Chief	A. Agayan, HMCS, USN
01	Director, Resources and Finance	S.L. Hayes, LCDR, MSC, USN
02	Director, Administration	J.P. Sanderson, LCDR, MSC, USN
04	Director, Research and Development	L. Yaffe CDR, MC, USN

The Naval Medical Research and Development Command (NMRDC) is committed to providing the biomedical research needed to enable the men and women of the Navy and Marine Corps to perform their mission safely and effectively. NMRDC scientists conduct basic, clinical, and field research directly related to military requirements and operational needs. Current studies focus on military recruits, special training groups, and personnel in the surface, submarine, air, and amphibious warfare communities. NMRDC laboratory facilities equal those at modern academic and industrial institutions. Also, research is supported in other Navy laboratories as well as in partnership with the Army and Air Force and with other Federal agencies. Research in non-government laboratories is promoted through an active collaborative research and technology transfer program that develops cooperative research and development agreements with universities and private industry to ensure that research products from our laboratories benefit the entire country.

Navy-supported medical research efforts have influenced the civilian practice of medicine, assisted the Ministries of Health in developing nations, and provided technology for other Federal initiatives.

NMRDC's research programs are divided into six major areas. A headquarters staff officer is assigned as the Research Area Manager for each program area. The Research Area Managers are the central contact points between the laboratories, where the research takes place, and headquarters, where budget decisions are made and research planning and execution policy is established. The Research Area Managers manage both intramural and extramural research activities. The in-house research efforts are complemented by a contract and grant program with universities and private industry.

## NMRDC's six major research areas

### Combat Casualty Care

The Combat Casualty Care Program, NMRDC's largest research program, directs research with results that enhance fleet health care, augment field treatment capabilities, and improve the medical logistics necessary to support Navy and Marine Corps personnel. On-going projects focus on developing and incorporating advanced medical capabilities into each echelon of combat medical care. To improve combat casualty care, investigators are developing technologies to enhance recovery from combat-related illnesses and injuries. Scientists are developing techniques for acclimating personnel to extreme environmental temperatures. Advancements are being made in developing universally transfusable human red blood cells and in evaluating the effectiveness of blood substitutes. Improved procedures are being developed for enhancing the recovery of injured hematopoietic and immune systems with the development of therapeutic reagents and with the use of recombinant growth factors and cytokines.

#### Current efforts include:

- Field usable diagnostics
- Blood substitutes
- Immune system recovery
- Septic shock
- Patient identification and management aids
- Combat medical devices
- Critical medical information capture, storage and transmission tools
- Hemorrhagic shock
- Blood products
- Hematopoietic stem cells
- Wound healing
- Hot/cold weather injuries
- Medical readiness planning tools
- Musculoskeletal injury
- Casualty stabilization and resuscitation

#### Examples of Products Under Development

Product	Description	Benefit
Recruit Fitness Training Schedule	A fitness program was developed to produce physically fit Marines after 11 weeks of training while reducing the impact of stress fractures.	A reduction of stress fractures by 2% in one year will save \$5.2M annually at NCRD San Diego and save 15,000 lost training days. An additional savings of approximately \$1.2M annually will result from the reduction of the overall rate of musculoskeletal injuries from 34% to 24%.
Predictive profile for graduation from BUD/S	An epidemiologic model which links successful graduation from BUD/S to a trainee's fitness.	A significant improvement in physical fitness in trainee selected from NTC, Great Lakes can be expected to increase graduation rates by 20% yielding a cost savings of \$750,000 annually in PCS orders and relocation of family members. Once implemented, the program will have no additional costs.
FORECAS	FORECAS is an interactive tool for medical planners designed to project the numbers of ground casualties (WIA, KIA, DNBI) likely to be sustained during various ashore	Accurate predictions of the likely casualties to be incurred helps ensure that while sufficient medical and manpower resources are deployed to meet the medical demands of the

	combat scenarios.	operations, they are not oversupplies.
SHIPCAS	SHIPCAS is an interactive tool for medical planners designed to project the numbers of shipboard casualties (WIA, KIA, DNBI) likely to be sustained during various afloat combat scenarios.	Accurate predictions of the likely casualties to be incurred helps ensure that while sufficient medicine and manpower resources are deployed to meet the medical demands of the operations, they are not oversupplied.
MEDTAG	MEDTAG is a hand-held device for retrieving data stored electronically on an individually carried card and for documenting battlefield injury data, patient conditions information, and treatments rendered.	More rapid and accurate documentation of clinical information will lead to more timely care, reduced recovery time, and improved effectiveness.
OPTEVAC	An interactive tool for medical planners designed to project the required evacuation assets to transport casualties from the point of injury to the Echelon II treatment facility and then back to an Echelon III facility. OPTEVAC factors in the distances between facilities and deployment nodes and provides the planner with the number and types of air/ground ambulances needed.	Accurate predictions of the required evacuation assets help ensure that while sufficient transport vehicles to handle the casualty evacuation demands of an operation are deployed, they are not oversupplied.
Special Operations Interactive Medical Training Program	SOIMPT is an interactive computer-based medical training program. It contains 18 modules in subject areas relevant to special warfare operations.	SOMPT provides specialized medical training without the need for an instructor to be present. It will ultimately help to improve the skills of corpsmen and medics serving with the special operations forces.
OSHSYS	An interactive tool for naval operations and facility safety manages to identify the costs of civilian employee occupational injuries, to compare their local facility injury rates with other facilities, and to assess the effectiveness and economic value of prevention and cost control programs.	Accurate predictions of the full costs over time of new occupational injuries will facilitate safety program planning and increase accountability at the local level.
Frozen Blood	By drawing, freezing, storing and distributing frozen units of blood, the logistics burden is lessened considerably.	Provision of blood and blood products where and when needed.

## Infectious Disease

With Sailors and Marines deployed around the world, mission-specific medical research on infectious diseases continues to be one of the Navy's highest priorities. Deployed personnel can be exposed to endemic diseases, many of which are rarely, if ever, encountered by physicians in the United States. For this reason, the Navy has developed a series of strategically located overseas laboratories to study disease threats. These laboratories conduct basic, clinical, and field research related to the health and operational readiness of Sailors and Marines deployed to specific areas overseas. Each laboratory is capable of deploying highly trained personnel and state-of-the-art laboratory diagnostic capabilities to any remote location. These laboratories, teamed with strong basic-science and technology-based laboratories in the United States, develop methods to prevent, diagnose, and treat the many tropical diseases encountered during military operations. The results of this continuous research has been key to the success of many military missions.

### Current efforts include:

- Methods for rapid identification and diagnosis of microorganisms that cause disease
- Epidemiologic assessment of emerging infectious diseases
- Development of field test sites for vaccines, drugs, and equipment
- Development of vaccines and drugs to prevent and treat:
  - Diarrheal diseases
  - Respiratory diseases
  - Rickettsial diseases
  - Malaria
  - Arboviral diseases
  - Hepatitis E
  - HIV

### Examples of Products Under Development

Product	Description	Delivery Date
Extended Duration Repellent	insect repellent	FY90
Pemethrin	insect repellent	FY90
Halofantrine	antimalarial	FY92
JE vaccine	vaccine	FY92
Hepatitis A	vaccine (inactivated)	FY95
Campylobacter IND	vaccine (whole cell inactivated)	FY01
Argentine Hemorrhagic Fever	vaccine	FY98
Tic Borne Encephalitis	vaccine	FY98
Shigella flexneri vaccine	recombinant vaccine	FY99
ETEC vaccine	whole cell inactivated	FY99
Azithromycin	anti-malarial	FY00
Hepatitis A&B	combined vaccine	FY01
Korean Hemorrhagic Fever vaccine	vaccine	FY00
Mutant labile enterotoxin	mucosal adjuvant	FY98
Shistosoma Topical Antipenetrant	skin cream	FY00
Halofantrine	prophylactic anti-malarial	FY00
Chikungunya vaccine	live vaccine	FY00
WR238605	antimalarial drug	FY00
Meningococcal Group B vaccine	subunit vaccine	FY00
ETEC vaccine	microencapsulated	FY01
Hepatitis A vaccine	live virus vaccine	FY01
Rift Valley Fever vaccine	live virus vaccine	FY01
Leishmania skin test		FY01
Plasmodium falciparum vaccine	blood stage vaccine	TBD
P. vivax vaccine	multistage vaccine	TBD
WR6026	anti-leishmanial drug	TBD
Hemorrhagic Fever Renal Syndrome	recombinant vaccine	TBD

vaccine		
Arteether	anti-malarial drug	TBD
Dengue vaccine	multivalent vaccine	TBD
Cholera vaccine	whole cell plus B subunit	FY99

## Diving and Submarine Medicine

Current research in the diving and submarine medicine program focuses on solutions to medically-related problems identified by the Navy's submarine, diving, explosive ordnance disposal, and special warfare communities. In response to specific community-identified problems, scientists are conducting research in the biomedical and behavioral aspects of the submarine and diving environments. These include efforts focused on submarine rescue, deep water recovery, underwater construction, explosive ordnance disposal, and other diving scenarios. Current research also examines the areas of sonarman performance, qualifications for submarine duty, and methods to improve crew health and safety. Special warfare research focuses on personnel performance, performance enhancement, and exercise-related injuries.

### Current efforts include:

- Submarine medicine
- Medical qualifications for submarine duty
- Diver air quality
- Crew health and safety
- Submarine air quality
- Biomedical standards for diver life-support equipment
- Long term health consequences of diving
- Special Warfare/Explosive Ordnance disposal
- Multilevel diving procedures
- Dry deck shelter air quality
- Enhanced sonarman performance
- Effect of low frequency sonar on personnel
- Hearing conservation
- Emergency escape procedures
- Diving Medicine
- Treatment of decompression sickness and gas embolism
- Improved decompression procedures
- Optimal use and toxic effects of oxygen
- Maximizing human performance

### Examples of Products Under Development

Product	Description	Benefit
Probabilistic Algorithm for Air Decompression	Decompression model based on statistical analysis of a defined database	Increased safety for deep air diving / multi-level capability
Diver Planner (Version 6.0)	Software program that enhances ability to perform multiple level diving	Reduced decompression time
Saturation Abort Tables	Procedure to provide safe desaturation for submariners exposed to saturation during disabled submarine scenarios	Decreased morbidity/mortality during disabled submarine scenarios
Predictive Model for CNS Oxygen Toxicity	Model to predict onset of oxygen toxicity for single or multi-level dives	Increased safety capability
Reliable Marker of CNS O2 Toxicity	Test for CNS O2 toxicity	Increases safety capability
Emergency O2 Decompression	Procedures for O2 decompression for Special Warfare	Cuts decompression time five-fold

Procedure

Methods to Extend O <sub>2</sub> Tolerance	Dietary modification for decreased O <sub>2</sub> risk	Increased capability
High O <sub>2</sub> Helium Decompression tables	Special Warfare tables for new work in diving rig	Reduced decompression time for deep mine countermeasures missions
Underwater Decompression Meter	A decompression computer that calculates "real time" decompression requirements and calculates "best possible decompression schedule"	Markedly improved Naval special Warfare capability to perform multilevel diving associated with SEAL Delivery Vehicle, Dry Deck Shelter operations
Use of Color Contrast to Enhance Navigational Aids	Defines optional use of color contrast to enhance visualization of environment	Enhanced visual recognition of navigational aids
Identification of Individual Susceptibility to Oxygen Toxicity	The program is designed to define individual susceptibility to oxygen toxicity	Will determine whether individuals with increased sensitivity to oxygen toxicity can be identified. This capability could be used in initial selection of Naval Special Warfare personnel required to use 100% oxygen rebreathers.
Sonar Headset and Signal Shapers	Active noise canceling headsets and sonar signal shaping filters for use in submarine sonar rooms	Submarine COs report detection and classification of targets earlier with this package
Underwater Sound Guidance	Develop safety exposure limits for civilian and military divers operating within range of advanced low frequency sonar system	Reduces probability of injury to Navy divers
Underwater Sonar Guidance	Develop diver safe standoff distance from transmitting sonars for all divers	Allows simultaneous sonar transmission and diving, reduces probability of diver injury
Rescue Manual (Update)	Pressurized submarine rescue manual for medical officers/submarine fleet	Maximizes probability of survival from disabled submarines
Active Noise Cancellation Stethoscope	Develop an active noise reduction stethoscope for field and shipboard use in noisy environments	Improves treatment and health care of casualties in a variety of high noise settings
Revised SUB Medical Qualifications Guidance	Determine if current medical qualification criteria is data-based; if not, revisit through R&D	For renal stones, instituting waiver resulted in estimated savings of \$4.5M in manpower over four years. Prevented 220 submariners from being disqualified.
Medical Test Procedures	Medical procedures for conduct of submarine hull compartment and sonar dome pressurization test	Reduced probability of casualty due to improper ventilation and pressurization
Psychiatric Screening	Revised, standardized procedures for psychiatric screening for submarine service	Screens out at risk candidates for submarine service; reduces the probability of MEDEVACs
SEAL Delivery Vehicle (SDV) Operator Performance	Software system that captures and stores operator performance measures of critical tasks in SDV simulator	The multi-million dollar SDV and SDV simulator lack a quantitative method of evaluating operator performance

Measurement System (OPMS)		
Calisthenics Guidelines for Special Forces	Published descriptions and photos demonstrating proper techniques	Reduced musculoskeletal injuries, improved training efficiency
Contra-Indicated Exercises Currently Used by Naval Special Forces	Comprehensive list distributed to all special operations training coordinators	Reduced musculoskeletal injuries
Underwater Sound Protection Device for Divers	Protection from bioeffects for divers exposed to intense underwater sound	No means exists to monitor low frequency acoustic active sonar exposure on submerged divers
Medical Data Analysis System	Research tool to track incidence of illness and injuries for research and produce routine reports	Quantification of outpatient visits for improved management and treatment
Incisive and Useful Information on Hypothermia Causes and Countermeasures	Scientific literature survey and technical reports	Improved medical surveillance and prevention of hypothermia during field exercise
Psychological Screening Tests for Basic Underwater Demolition/SEAL Candidates	MMPI and NEO5 factor personality inventory scores correlated with probability of attrition	Reduced student attrition (\$136K/student) and improved instructor allocation
Improved Treatment of Iliotibial Band Syndrome	Phonophoresis with 10% hydrocortisone	Return to duty 6 days sooner than standard treatment
SDV Operator Performance During Cold Water Missions	Database of physiologic responses and thermal status of SEALs during prolonged cold water immersion	Improved mission planning and probability of success
Inventory of SDV Operator Critical Tasks and Abilities	Identification of critical tasks for SDV mission success	Improved SDV operator training time and mission rehearsal
Validation of EOD PRT Standards	Identification of critical EOD tasks and required level of physical fitness	Cost associated with litigation and/or unnecessary forced retirement
Carbon Dioxide Sensor	Development of CO2 sensor/alarm system to warn of hazardous CO2 levels in closed circuit rebreathers	Improved safety in diving
Atmospheric Guidelines for Rescue and Escape from Submarines	Survival times in disabled submarine scenarios to determine DSRV deployment schedules	Improved DSRV zones of operations for successful rescue
Compendium of Ergogenic Aids	Complete review of potential aids to physical performance and application procedures for proven techniques	Potential reduced force attrition and improved probability of mission success
Ice Cooling Vests Technology Transfer for use in Hyperbaric Chambers	Technology transfer certification/approval to use Steele Ice Vest in hyperbaric chambers	Reduced incidence of hyperthermia

Landing Craft Air Cushion Crew Medical Standards	Changed 107 to the MANMED to establish medical standards for LCAC crew	Reduced loss of life and improved safety for LCAC crew
Carbohydrate Loading Protocol	Protocols to achieve and maintain muscle glycogen supercompensation	Improved endurance, performance and mission success
Photo-Refractive Keratectomy	Approval to use PRK on myopic military personnel	Long-term reduced costs of glasses and eye exams
Hyperbaric CO2 Analyzer	Portable CO2 analyzer for use inside Dry Deck Shelters	Control of DDS ventilation, minimizes use of submarine air
Contaminant Limits for Fleet Soda Lime	Testing procedures to ensure chemical safety of soda lime	Insure safe breathing gas
Revised Dry Deck Shelter Air Purity Guidelines	Procedure to screen submarine air bank gas prior to DDS operations	Insure safe air for DDS operations

## Fleet Occupational Health

In certain operational environments Sailors and Marines are at risk of exposure to physical, chemical, and biological hazards that may threaten their health and degrade operational performance. Techniques for understanding the mechanisms of injury and disease associated with these environments are being developed to reduce or prevent injury, improve safety, and optimize mission effectiveness. Scientists are focusing on Navy-specific operational scenarios to establish effective standards for occupational safety and health, environmental protection, damage control, and fire prevention. In determining exposure limits, researchers are concentrating on areas of study that include heat, noise, vibration, atmospheric contaminants, and various forms of electromagnetic radiation including lasers. The resulting research data are used to develop models predicting human exposure consequences in actual use situations, to tailor exposure limits for operational conditions and to recommend medical surveillance and treatment guidelines. Researchers also are investigating the effects of life style factors including obesity, hypertension, smoking and drug use on military readiness.

Current programs efforts include the assessment of biomedical risk and development of safe exposure criteria for:

- Noise
- Vibration
- Solvents
- Lubricants
- Shock
- Freon replacement compounds
- Hydraulic fluids
- Propellant
- Radio frequency energy microwaves

### Examples of Products Under Development

Product	Description	Benefit
Enhanced hearing protector	Earcup device made with super noise-absorbing material	Veterans' medical compensation for hearing loss exceeds \$230 million annually. Device could reduce costs 10% or more
NAVOSH Quality Assessment Model	Computer model that analyzes safety and health statistics to identify intervention opportunity	Reduce lost time injuries and illnesses for military and civilian personnel

Bioeffects of High Power Microwaves	Data on the bioeffects of non-ionizing radiation	Data used directly in the development of exposure standards for microwaves
Neurobehavioral Toxicity Assessment Battery	Battery of tests used to rapidly screen materials for neurotoxicity	10,000 new or reformulated hazardous materials added to Navy inventory each year. Test will permit screening candidate materials
Toxicity Assessment of a Submarine Contaminant	Comprehensive scientific investigation of toxic effects	Published data on the toxicity of DBNP contaminant in submarines. Needed for procurement guidance on lubricants.
Transcutaneous Analyte Measurement device	Non-invasive blood analyte detector	Potential life-saving treatment on battlefield and aboard ship by eliminating lab turn around time.

## Aviation Medicine and Human Performance

The Aviation Medicine and Human Performance Program plays a vital role in protecting warfighters from battle and non-battle operational conditions that are unique to the naval aviation operational environment. Naval aviation differs significantly from that of other services, operating in a maritime environment, including those conditions associated with the aircraft carrier and other air-capable ships. The goals for aviation medicine research are to protect military personnel from current and emerging operational, environmental and materiel hazards, enhance individual and unit performance under all operational conditions; develop performance models and realistic system safety/design criteria; quantify performance criteria to improve operational concepts and doctrine, and provide biomedical products and information in support of naval aviation system acquisitions.

### Current Programs focus on:

- Development of a vestibular function test (Unilateral Otolith Function Test) for evaluating pilot applicants.
- Development of prototype tactile interfaces to improve improved aviator selection test battery.
- Fielding of training and design recommendations to combat the effects of night vision device-induced visual distortion on safety of flight
- Demonstration of new physiological and neurophysiological approaches to the dynamics of spatial orientation.
- Development of situation awareness in flight environments.
- Performance evaluation of enhanced night vision devices and training aids.

### Examples of Products Under Development

Product	Description	Benefit
Agile Laser Eye Protection Prototype	Nonlinear optical materials that provide day/night usable eye protection against frequency agile lasers	Increase protection for personnel from emerging threat of lasers to aviators. Savings dependent on extent of laser weapons obtained by future adversaries.

Female Ejection Injury Threshold Model	Provide biomedical information for ejection seat designers to reduce immediate threat of lumbar and thoracic spine injuries to females and small stature males	Reduction of injury and possible loss of life during ejections. Cost savings unknown due to small number of females in combat aircraft. Estimate conservatively \$100K/female/non Class A ejection.
Prototype Vibrotactile Display	Vibrotactile suit provides aviator tactile feedback of his/her position in space while flying. Also provides special warfare divers navigational and threat information	Provides better orientation cue for aviators, reducing a major contribution to aircraft mishaps. Prevention of one F/A-18 spatial disorientation aircraft accident per year equates to a savings of \$36.8M.
Unmanned Aerial Vehicle (UAV) Operators Selection Test Battery	Medical and performance standards for screening candidates for entrance into the UAV External pilot or Internal training program.	Reduce attrition during training resulting in savings of training costs of \$300K/year.
Helicopter Instrument Scan Pattern Tracker	Noninvasive eye tracker for 2B42 flight simulator which provides feedback to instructor on student instrument scanning behavior.	Break down of visual scan pattern has been a contributing factor to naval aircraft accidents. This device will provide training aids to develop improved eye scan behavior.
Performance-based Occupational Strength Test	Test battery to identify individuals capable of meeting specific strength performance requirements to safely conduct flight operations.	Provides biomedical information for screening men and women for aviation aircraft and for design of new aircraft.
Portable Unaided Night Vision Training Kit	Instructor kit for training of biomedical effects on humans during night operations. Provides biomedical performance information and strategies for safe operations during night operations.	Replaces four aviation training devices resulting in a cost savings of \$62K/training site. Increases safety of flight during night operations. This kit has been transitioned into civilian production.
Night Vision Goggle (NVG) Focusing Aid	Eye piece focusing aid for NVGs	Eliminates the need for a 21 foot light-tight room for aircrew to focus their NVGs. This product has been patented; licensing for production is in the discussion stages.
Landing Craft Air Cushion (LCAC) Selection System	An automated cognitive and psychomotor test battery to predict LCAC operator, engineer, and navigator training and fleet performance.	Reduced crew attrition from 40% to under 10%, a \$420K/year training cost savings.
Sleep Management Guide	Provides biomedical information support for operational commands to assist in decisions and planning regarding sustained operations.	Reduce accidents by reducing performance degradation due to fatigue from sleep loss.
Color Night Vision System	A sensor-fusion device combining visible and thermal infra-red information to deduce color and heighten contrast.	Reduce NVG related aircraft mishaps. Between 1987 and 1993, 13 rotary wing and 5 fixed wing Class A mishaps employing NVGs occurred. System reducing Class A mishaps under NVGs by 10% will result in cost savings of \$60M

over a five year period.

Work/Rest Guidelines for Damage Control Personnel	A modified Physiologic Heat Exposure Limit for male and female workers in protective wear.	Reduce number of heat exhaustion cases for damage control personnel.
Cognitive-Behavioral Motion Sickness Desensitization Training Program	Protocol to return student aviators, who experienced severe motion sickness, to training. Protocol has been found to be 80% effective.	Cost savings of training investment of \$25K/student returned to training.
Neuro-Otological Assessment Battery	Test battery of vestibular/spatial orientation tests to evaluate pilot applicants and motion sickness/vertigo/disorientation referrals	Screen candidates predisposed to experiencing a partial disorientation, but whose deficiencies cannot be detected by current clinical tests. Reduce likelihood of aircraft accidents due to spatial disorientation.
Human Performance Cold Operations Model (HPCOM)	HPCOM will predict safe exposure times for flight deck and amphibious operations. Predicts human performance in cold weather operations.	Reduce decrements in human performance associated with flight deck operations during cold weather operations.
Laser Threat Assessment Tool	Develop a PC-based laser threat assessment tool for mission planners who expect to encounter laser threats in a joint Navy and Air Force team.	Reduce mission abort or failure due to laser attacks on naval aviators.
Temporal Acuity Vision Test Battery	Screening tool to determine temporal acuity of aviation candidates.	Savings training funds by reduction of failures during advanced training.
Naval Aviation Medical Criteria Methodology	Methodology for evaluation of effects of therapeutics considered for using while flying	Decrease time to return aviators to duty in a flying status after injury or illness
Women at Sea Medical Tracking program	Epidemiological tools planning regarding sustained operations.	Improved health care delivery at the deckplates for women at sea.

## Dental Readiness Research

Dental problems significantly impair operational readiness and sustainability. Sailors and Marines can find themselves in operational settings with no immediate access to dental care where dental problems could jeopardize a multi-million dollar mission. These military-unique situations require dental research to characterize patient populations, identify better diagnostic and risk assessment techniques, develop better methods of prevention and treatment, and improve the dental health care delivery system.

### Current efforts focus on:

- Identification of patients at high risk for dental disease
- Rapid and improved diagnostics techniques
- Evaluation of preventive and treatment methods that promote dental wellness
- Dental emergencies during operational deployments
- Epidemiologic assessment of treatment needs

### Examples of Products Under Development

Product	Description	Benefit
Determination of bisphenol A in dental sealants	Assess the presence of bisphenol A, bisphenol A dimethacrylate and bis-GMA in dental sealants using HPLC and GC/MS	Reassess the safety of dental sealants, which are used extensively to treat Navy and Marine Corps personnel
Naval dental sealant program effectiveness	Assess the retention of sealants and the long term prevention of dental caries	Assess the value of the sealant program as a component of managed care
Tobacco cessation effectiveness	Evaluate effectiveness of commercially available cessation programs	Wellness of Navy and Marine Corps personnel
Dental Emergencies	Determine the impact, risk factors, and predictors of dental emergencies	Provides essential information for risk assessment, treatment, and improving dental readiness
Managed Dental Care Effectiveness	Evaluate the effectiveness of the Managed Dental Care Program	Potential cost savings through increased efficiency and effectiveness; cost benefited to managed dental care program.
Risk Assessment Program	Develop a risk assessment program to include methods to assess dental disease activity and disease progression; develop a non-invasive method with NASA to accurately assess periodontal disease activity; develop method with 2-D gel electrophoresis to assess disease activity indicators.	By knowing risk, treatment resources can be directed in the most efficient and effective manner; dental emergencies can be reduced; and readiness increased.
Failure analysis of restorative materials	Determine failure analysis of restorative materials to optimize materials and decrease treatment failure when employed under military circumstances; includes sensitive and highly visible effort to investigate mercury-free amalgam; many commercial materials unsuitable for	Allows optimum materials procurement and utilization by the Navy Dental Corps.

military use.

Alternative 3rd Molar treatment strategies in women	Determine military consequences of an alternative 3rd molar treatment strategy for females; directed towards estimating the incidence of post-extraction complications as a function of potential risk factors such as menstrual cycle.	Can generalize findings to any elective surgery in women resulting in decreased post-operative complications; significant man-hour savings.
Rapid Chairside Test for diseases	Field-test a 5-minute chairside test for oral and other diseases; immunoassay potential for rapid assay of antibodies in saliva to disease-related antigens with such diseases as tuberculosis and hepatitis; patent pending	Allows rapid screening for diseases to be made at one appointment without complicated laboratory tests which will result in significant savings of money and personnel; can be performed by auxiliary personnel; significant cost benefit from improved efficiency and readiness
Optimum treatments for acute endodontic and periodontic conditions	Assess optimum periodontal and endodontic treatments suitable under military circumstances including clinical treatments for oral inflammatory conditions which may cause acute pain, swelling, systemic manifestation, and tooth loss, there by impairing readiness	Improved treatment capability; increased readiness
Work environment modeling	Develop work environment modeling for use with managed dental care program	Rapid assessment of plant property equipment; optimizes resource allocation using clinic configuration, patient flow, personnel, schedules, and treatment requirements.
Patient scheduler	Develop a dental patient scheduler system for use with managed dental care program	Enables treatment resource allocation by population need
Dental disease progression rates	Develop a unique method and device to determine dental caries progression rates using digital image processing and custom software; human prototype assembled and testing underway; related to risk assessment initiatives.	Knowledge of caries and other dental disease progression rates is crucial to accurately predicting need for invasive treatment
Characterize dental waste water	Characterized mercury-containing dental waste water from Navy dental treatment facilities; provides fundamental information necessary to develop optimum ways to address this problem; EPA certification of NDRI for mercury analysis anticipated by FY96/3Q.	Provides the scientific basis for addressing the problem of mercury in dental waste water
Smart Card	Modify smart card by adding dental component and use to track patients, dental treatment needs, and outcomes; NDRI has been given permission by DoD to participate as a test site and contribute a dental component for this technology.	Tracking patients accurately, efficiently, and effectively is essential to improving dental readiness within the managed dental care program

Optical mark recognition	Develop optical mark recognition versions of standard dental forms to determine real-time dental treatment needs, outcomes, and create a dynamic database; will generate standard forms.	Treatment needs database allows more efficient use of resources and improved planning and resource allocation
Multimedia dental examiner calibration system	Develop a multimedia system to calibrate dental examiners; will allow computerized evaluation of provider calibration; necessary for managed dental care program, system complete.	Provides standardized dental classification necessary for the managed dental care program; cost benefit tied to this program.
Dental Multimedia diagnostic system	Develop a dental multimedia diagnostic system to improve the capability of independent duty corpsmen to diagnose and treat emergency dental conditions at remote or isolated duty stations; includes radiographic diagnosis and teledentistry modules; prototype complete with beta testing in process.	Cost benefit tied to improved patient care capability by non-dentists and decreased MEDEVACs
Mercury Amalgam Separator, clinic	A prototype system was construct which effectively removes soluble and insoluble mercury from dental waste water; suitable for large clinic use; in use at NDC, Norfolk; industrial partner contacted, patent pending.	Savings of approximately \$150K a year for NDC, Norfolk or similarly sized facilities
Mercury Amalgam Separator, chairside	A prototype device was constructed which effectively removes particulate mercury-containing amalgam from dental waste water; suitable for small clinic or chairside use; patent pending	Potential to save approximately \$5K per dentist per year compared to contract disposal of waste water
Rapid chairside test for periodontal diseases	A 5-minute rapid chairside test for microbial proteases produced by periodontopathic bacteria has been developed; a second 5-minute rapid immunoassay for periodontopathic bacteria has also been developed; both will form the basis of a periodontal disease risk assessment program; vast improvement over commercial products; prototype test kits being manufactured by industrial partner; two patents pending	Allows rapid screening of military personnel for risk of developing periodontal diseases; can be done at one appointment; nothing comparable available commercially; cost benefit linked to reduced dental emergencies and managed dental care program.
Rapid chairside test for dental caries	A 5-minute rapid chairside test for <i>S. mutans</i> has been developed; will form the basis of a caries risk assessment program; current commercial test takes 48 hours; prototype test kits have been manufactured by industrial partner; patent pending	Allows caries risk assessment to be made at one appointment; nothing comparable available commercially; cost benefit tied to managed dental care program
NDRI Radiograph QA program	Developed automated radiographic QA program which will improve radiographic quality assessment and decrease need for re-processing	Cost savings from improved radiographic quality, consistency, and error reduction.
Handpiece sterilization	Study of dental handpieces to determine if handpiece lubricants interfere with sterilization	Cost benefit related to information necessary for effective sterilization procedures and equipment

**Naval Medical Research and Development Command  
1996 Command History**

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Dental sealant in Navy personnel	Longitudinal study of dental sealants placed by dental auxiliaries in Navy recruits; examined cost effectiveness of procedure and the feasibility of sealant placement by auxiliaries; first time this has been done in this type of population.	Demonstrated a cost effective preventive method for caries that could be used by auxiliaries; estimated dental treatment dollar savings of 29%
3-D imaging	Applied 3-D quantitative computer visualization of hard and soft tissues for oral surgery and orthopedics	Vastly improved treatment capability with concomitant cost benefit, e.g., imaging of facial bones, wrist bones, hip fractures, etc.
Modified periodontal screening record	Modified the widely used Periodontal Screening Record for Navy use under the managed dental care program	Cost benefit tied to managed dental care program
Managed dental care pilot program	A comprehensive pilot study based on prioritized dental care was conducted at RTC Orlando resulting in a managed dental care system adopted by BUMED for Navy-wide implementation; this is a dental readiness initiative which has as its central focus the conversion of dental class 3 patients to class 2/ class 1.	Anticipated multi \$M cost benefit primarily through improved dental readiness
Naval Reserve dental Treatment needs	Assessed dental treatment needs of Navy and Marine Corps Selected Reserves; never before accomplished	Improved management in event of reserve recall

### **The Laboratory System in brief**

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**Naval Medical Research  
and Development  
Command  
(NMRDC)**

An NMRDC staff officer is assigned as the Research Area Manager (RAM) for each program area. The RAMs are the central contact points between the laboratories, where the research takes place, and headquarters, where budget decisions are made and research planning and execution policy is established. The RAMs manage both intramural and extramural research activities. The in-house research efforts are complemented by a contract and grant program with universities and private industry.

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email: [jonest@mail-gw.nmrdc.nmnc.navy.mil](mailto:jonest@mail-gw.nmrdc.nmnc.navy.mil)  
homepage: <http://www.dnso.mil/NMRDC/>

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**Naval Aerospace Medical  
Research Laboratory  
(NAMRL)**

Current research is directed at the development of performance-based biomedical standards for Navy and Marine Corps air crews; the development of methods to enhance aircrew performance, aviation selection and assessment and human factors engineering; and the development of methods to protect personnel from environmental hazards associated with naval aviation operations.

CAPT L. H. Frank, MSC, USN, Commanding Officer  
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51 Hovey Road  
Pensacola, FL 32508-1046

phone: 904-452-3286 (DSN 922-3286)  
email: [CO@namrl.navy.mil](mailto:CO@namrl.navy.mil)  
homepage: <http://www.namrl.navy.mil/>

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**Naval Submarine  
Medical Research  
Laboratory  
(NSMRL)**

Scientists are conducting basic and applied research in the biomedical and behavioral sciences aspects of submarine, hyperbaric, and diving environments. Scientific fundamentals are being established for the continued expansion of the physiological limits and capability of man in the sea, whether in diving or closed-habitation mode.

CAPT R. Walter, DC, USN, Commanding Officer  
Naval Submarine Medical Research Laboratory  
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Naval Submarine Base, New London  
Groton, CT 06349-5900

phone: 860-449-2503 (DSN 241-2503)  
email: [WALTER@nsmrl.navy.mil](mailto:WALTER@nsmrl.navy.mil)

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**Naval Medical Research  
Institute  
(NMRI)**

Scientists conduct research in a wide variety of biomedical disciplines; current interests include the physiology of thermal stress and thermal adaptation, biochemistry, pathophysiology and histopathology of sepsis and wound repair, immunology, infectious diseases, molecular biology, electrophysiology, and diving medicine and bioengineering.

CAPT T. Contreras, MSC, USN, Commanding Officer  
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homepage: <http://131.158.70.70/>

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**Naval Medical Research and Development Command  
1996 Command History**

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<b>Naval Medical Research Institute Detachment (Toxicology) (NMRI/TD).</b>	<p>This detachment is part of a Tri-Service Toxicology Consortium and the Navy's sole toxicology research laboratory. Current programs focus on toxicology of materials in operational environments. The resulting research data are used to develop predictive models for operational exposure scenarios, to develop more accurate and protective exposure limits tailored to the exposure circumstances, and to recommend medical surveillance and treatment guidelines for potentially exposed personnel.</p> <p>CAPT(S) K.R. Still, MSC, USN, Officer-in-Charge Naval Medical Research Institute Detachment (Toxicology) NMRI/TD BLDG 433 2612 Fifth Street Wright-Patterson, AFB, OH 45433-7903</p> <p>phone: 937-255-6058 (DSN 786-6058) email: <a href="mailto:kstill@navy.al.wpafb.af.mil">kstill@navy.al.wpafb.af.mil</a> homepage: <a href="http://www.navy.al.wpafb.af.mil/triinfo/navy.nmrtd.htm">http://www.navy.al.wpafb.af.mil/triinfo/navy.nmrtd.htm</a></p>
<b>Naval Medical Research Institute Detachment (NMRI Det).</b>	<p>This is the only Navy medical facility in South America. Research focuses on the diagnosis and treatment of infectious diseases of military importance in South and Central America.</p> <p>CAPT M. Wooster, MSC, USN, Officer in Charge Naval Medical Research Institute Detachment/Unit 3800 American Embassy APO AA 34031</p> <p>phone: 011-51-1-561-2733 email: <a href="mailto:oic@namrid.sld.pe">oic@namrid.sld.pe</a></p>
<b>Naval Medical Research Institute Detachment (Brooks) (NMRI Det (Brooks))</b>	<p>Commissioned in October 1994, this detachment is part of a tri-service electromagnetic radiation bioeffects research group. The detachment's primary mission is to conduct research, development, testing and evaluation on the biomedical effects of electromagnetic radiation.</p> <p>LT R. LeBlanc, MSC, USN, Officer-In-Charge Naval Medical Research Institute Detachment Brooks AFB 8308 Hawks Road Brooks AFB, TX 78235-5324</p> <p>phone: 210-536-4699 (DSN 240-4699) email: <a href="mailto:randal.leblanc@navy.brooks.af.mil">randal.leblanc@navy.brooks.af.mil</a> homepage: <a href="http://www.brooks.af.mil/NMRI/nmri.htm">http://www.brooks.af.mil/NMRI/nmri.htm</a></p>
<b>Naval Health Research Center (NHRC).</b>	<p>Research efforts at NHRC focus on operational epidemiology, medical operations research, medical and performance modeling, operational performance assessment and enhancement, medical informatics, health promotion, readiness standards, and the effects of continuous operations.</p> <p>CAPT L. M. Dean, MSC, USN, Commanding Officer Naval Health Research Center P O Box 85122 San Diego, CA 92186-5122</p> <p>phone: 619-533-8428 (DSN 553-8428) email: <a href="mailto:co@vax309.nhrc.navy.mil">co@vax309.nhrc.navy.mil</a> homepage: <a href="http://www.nhrc.navy.mil">http://www.nhrc.navy.mil</a></p>
<b>Naval Dental Research Institute (NDRI).</b>	<p>This facility conducts research in fleet and field dentistry and is the only DoD laboratory dedicated to combat dentistry and oral disease research. Navy dental research exists primarily to increase operational readiness and the results of dental research directly impacts every Sailor and Marine during peace and war.</p> <p>CAPT G. K. Jones, DC, USN Naval Dental Research Institute 2701 Road, Building 1-H, NTC Great Lakes, IL 60088-5259</p> <p>phone: 847-688-4678 (DSN 792-4678) email: <a href="mailto:drglcol@grl10.med.navy.mil">drglcol@grl10.med.navy.mil</a></p>

**Naval Medical Research and Development Command**  
**1996 Command History**

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homepage: <http://support1.med.navy.mil/ndri/>

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**Naval Medical Research and Development Command**  
**1996 Command History**

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**Naval Dental Research  
Institute Detachment  
Bethesda  
(NDRI Det Bethesda).**

This detachment is responsible for coordination and guidance of resident research performed as part of postgraduate specialty education, and for support of staff research projects.

CDR B.K. Nichol, DC, USN, Officer-In-Charge  
Naval Dental Research Institute Detachment Bethesda  
Naval Dental School  
8901 Wisconsin Ave  
Bethesda, MD 20889-5602

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email: bnicoll@btdacr.med.navy.mil

**Naval Medical Research  
Unit  
No. 2  
(NAMRU-2).**

Scientists at NAMRU-2 conduct research on the diagnosis and treatment of infectious diseases. The majority of tropical infectious diseases of military importance occur in Indonesia.

CAPT H. Petersen, MSC, USN  
Naval Medical Research Unit No. 2  
Box 3, Unit 8132  
APO, AP 96520-5000

email: PETERSEN@SMTP.NAMRU2.GO.ID

**Naval Medical Research  
Unit  
No. 3  
(NAMRU-3).**

NAMRU-3 scientists conduct a multi-faceted basic, clinical and field research program relating to the health and operational readiness of military personnel assigned or deployed to Southwest Asia or Africa

CAPT A. Mateczun, MC, USN  
Naval Medical Research Unit No. 3  
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## Intellectual Property - Patents

### Why the Government files patents

The Government's interest in patents parallels that of private industry even though the Government does not compete in the commercial market. Two reasons exist for the Government to obtain patents. The first reason is for defensive purposes. A patent owned by the Government precludes another party from obtaining a patent on the same invention and asserting it against the Government. The second reason is that a patent may be used to transfer technology developed with Government research and development funding to the public and private sector. The patent which the Government receives may be licensed to interested parties who agree to commercialize the invention for the benefit of the general public.

There are two major sources of inventions in which the Department of the Navy acquires rights for the benefit of the Government. The first is from its military personnel and civilian employees, primarily those who work in laboratories or are involved in research and development activities. A second source is from contractors/grantees performing work under Navy research and development contracts/grants. The Government may acquire either a license to use these inventions or full ownership of the inventions, depending upon the circumstances.

Each Federal Agency is authorized by statute to license federally-owned patent applications, patents and other forms of protection obtained either on a royalty-free or royalty-bearing basis. The statute authorizes the granting of nonexclusive, exclusive or partially exclusive licenses. The Secretary of Commerce is authorized to promulgate regulations specifying terms and conditions upon which federally-owned inventions, other than inventions awarded by the Tennessee Valley Authority, may be licensed.

### PATENTS ISSUED TO NMRDC IN 1996

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#### US Patent 5,546,241

##### Projector Slides for Night Vision Training.

Issued August 13, 1996

**Abstract:** A slide holding a film with an image containing portion adapted for use in an application such as Night Vision Goggle training in which the film in the slide is to receive an extremely low level of light. A combination of filters is placed adjacent the light receiving face of the film and an opaque mat having a cutout corresponding to the film image bearing portion is placed adjacent both the light receiving side of the filters and the light output face of the film to reduce the amount of stray light reaching the film with the components held together by a pair of frame members each holding a glass plate next to a mat.

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#### US Patent 5,514,553

##### Production of Monoclonal Antibodies to *Treponema denticola* by Hybridoma TDII,IAA11.

Issued May 7, 1996

**Abstract:** A monoclonal antibody is disclosed which is reactive to *Treponema denticola* and produced by the hybridoma deposited under ATCC HB 9966. The invention also discloses diagnostic reagents and methods for detecting *Treponema denticola* utilizing the hybridoma deposited under ATCC HB 9966.

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**US Patent 5,494,795**

**Specific Oligonucleotide Primers for Detection of Pathogenic *Campylobacter* Bacteria by Polymerase Chain Reaction.**

Issued February 27, 1996 -

**Abstract:** This invention is a specific set of oligonucleotide PCR primers and a specific oligonucleotide probe (pBA273) for detection of PCR-amplified DNA from pathogenic strains of *Campylobacter*, specifically *C. coli* and *C. jejuni*, in fecal specimens.

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**US Patent 5,486,821**

**Artificial Horizon Altitude Warning System.**

Issued January 23, 1996

**Abstract:** An artificial horizon altitude warning system is provided for helping to prevent a controlled flight of an aircraft into the ground. The artificial horizon altitude warning system comprises an altimeter for gathering altitude information about the aircraft and generating an altitude signal; a laser assembly for producing a light in a cockpit of the aircraft; and a controller for receiving the altitude signal and for positioning the light in the cockpit to form an artificial line based on the altitude signal, the artificial line being positioned so as to be disposed along an accurate length corresponding to the location of an actual horizon as viewed by a pilot of the aircraft.

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**US Patent 5,485,834**

**Manually Tunable, Closed-Circuit Underwater Breathing Apparatus.**

Issued January 23, 1996

**Abstract:** This invention is a manually tunable underwater breathing apparatus (UBA) in which the resonant frequency of the UBA may be adjusted to meet the diver's breathing frequency by controlling the component of the UBA impedance. The principles of the present invention may be extended to existing UBA by adding a tuning apparatus comprising a valve, a tee and a tuned length of hose. Water displaced by volume change in the breathing bag due to exhalation/inhalation is partly diverted through the valve. Depending on the valve opening set by the diver the inertance and resonant frequency of the UBA can be altered to reduce breathing load.

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**List of CRADAs issued in 1996**

**CRADAs**

A Cooperative Research and Development Agreement (CRADA) is a special type of agreement provided by Congress to advance technology transfer. Under a CRADA, a Federal Laboratory can "accept, retain, and use funds, personnel, services and property from collaborating parties and provide personnel, services and property to collaborating parties." The following is a list of CRADAs issued in 1997 between the NMRDC organizations and non-Government partners shown. DTIC.

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**NHRC/The University of Alabama at Birmingham (UBA), NMRDC 444**

Effective: Mar 96,

Duration: 14 OCT 96

**Goal:** NMRDC/NHRC and UAB will collaborate in conducting the protocol entitled "Risk Factors for Chorioamnion Infection and Adverse Pregnancy Outcome Among Military Women". NHRC will supervise data collection for this project which will occur in two phases: the pre-natal visit phase and the delivery phase. At the pre-natal visit, the subject will undergo a vaginal swab for bacterial vaginosis (BV) evaluation, a cervicovaginal culture, and a serum collection (blood collected by venipuncture). At delivery, women who undergo a cesarean section (CS) with intact membranes and a sample of 200 other women per year who deliver vaginally or CS without intact membranes will be studied further with a blood specimen, a vaginal swab, placenta culture, amniotic fluid specimen, cord blood and infant nasal secretions. Data from the patients' and infants' medical records

will be collected by NHRC. NHRC will provide study data to UAB. UAB will study the clinical specimens for evidence of unusual pathogens as outlined in the study protocol. There will also be an additional 300 women delivering by Cesarean Section with ruptured membranes who will be enrolled in the study as well as 300 women delivering vaginally. NHRC will support UAB with epidemiologic analyses of laboratory and medical record data.

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**NMRI-Det / University of Washington Center for AIDS and STD, NMRDC 445**

Effective: Apr 96,  
Duration: two years

Goal: NMRI-Det, an operational U.S. Navy unit working in Peru under a Navy-to-Navy Agreement, provides medical training and assistance to the Peruvian Navy. NMRI-Det will continue its long-term research on the epidemiology of HIV-1 and HTLV-I in cooperation with local Peruvian scientists, now in collaboration with the University of Washington. The previous studies have defined the prevalence and incidence of infection by these retroviruses, and have identified other sexually transmitted pathogens among high risk individuals in Peru. Retroviral research priorities have been refocused toward studies to identify the genotypes of HIV-1 in order to devise strategies for the development of candidate vaccines. This research will complete identification of the genotype of a limited number of HIV-1 isolates in Peru, and will extend these studies to include typing of isolates obtained from selected countries in Central and South America.

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**NMRDC / TransMedica Incorporated, NMRDC 446**

Effective : 9 Aug 96,  
Duration: one year

Goal: NMRDC and TransMedica will evaluate the effectiveness of certain non-invasive acoustic detection technology in diagnosing the presence of coronary artery disease in cardiac patients. TransMedica has developed certain proprietary non-invasive acoustic detection technologies capable of detecting and identifying coronary artery disease in patients, and has incorporated that technology in its products. TransMedica will provide those products to NMRDC for use in clinical medical testing to be undertaken by cardiologists, will analyze the results of those tests, and will report its findings to NMRDC to verify the effectiveness of its non-invasive technology in identifying coronary artery disease.

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**NAMRL / Mold-Ex Rubber Company, Inc., NMRDC 449**

Effective: 21 Jul 96,  
Duration: two years

Goal: NMRDC/NAMRL will cooperate to develop state-of-the-art sound attenuation materials usable throughout DoD, and with potential commercial application. The Navy will provide acoustic expertise and unique sound testing equipment, and Mold-Ex will provide samples of novel acoustic materials, manufacturing personnel, facilities and equipment to aid in the development of the new materials.

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**NMRI / Integrated Diagnostics, Incorporated (INDX), NMRDC 470**

Effective: 2 Feb 96

Goal: NMRDC/NMRI and INDX will perform cooperative research and testing to develop, validate, adjust and determine the usefulness of new serological tests for dengue and the rickettsial systems of scrub typhus, typhus and the spotted fever group. The results will be published, and NMRDC/NMRI will provide training to INDX personnel in the production of antigens and reagents required for the preparation of test systems.

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**NMRI / Arista Biologicals, Inc., NMRDC 475**

Effective 31 Jan 96,  
Duration: three years

Goal: NMRDC/NMRI and Arista will utilize reagents, clinical and environmental samples, developmental rapid diagnostic and detection technologies and field evaluation capabilities of the NMRDC/NMRI's Biological Defense Research Program in combination with the diagnostic reagent production, diagnostic assay production optimization, and assay production capabilities of Arista to produce rapid diagnostic / detection assays for a variety of bacterial agents, toxins and antibodies to these agents. This cooperative agreement will transfer the technologies and reagents developed in the Navy program to facilitate production optimization, evaluation and commercial production of these rapid hand-held diagnostic / detection assays by

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Arista.

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## Research Highlights

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### Immune Based Therapy for Universal Unmatched Organ Transplantation

Organ transplant therapy is the only treatment option for disease, trauma, or burn induced failure of organs such as heart, lung, liver, kidney, bone marrow, or skin; but its use is currently limited by a lack of sufficient numbers of donor organs and by the immune rejection of the organ that typically follows transplantation due to our incomplete understanding of immune system function. Researchers from the Immune Cell Biology Program at the Naval Medical Research Institute, Bethesda, MD are developing an immune-based therapy that disables only the immune response against an unmatched donor organ, without compromising other immune functions. This is accomplished by blocking specific signals needed by the rejecting T lymphocytes. The T lymphocyte, also called the T cell, is the white blood cell primarily responsible for directing immune responses. When an organ is recognized by a T cell as foreign, and therefore to be destroyed, the T cell becomes activated. Alternatively, if a T cell encounters an organ known to be self, it does not become activated, and no immune response ensues. Therefore, two aspects of T cell function are important. The first is the mechanism used by T cells to recognize targets, and the second is how T cells distinguish between targets. This immune-based therapy, called anergy therapy, focuses on control of the second function. It precisely targets the rejection response against the donor organ without causing global immunosuppression (and resulting complications) caused by current anti-rejection treatment. This work is the subject of over 20 Navy patent applications and a Cooperative Research and Development Agreement with a commercial civilian research partner. The successful outcome of this research should afford effective means to activate T cells when desired (to improve vaccine efficacy or to augment immune responses against pathogens), or to prevent T cell activation when immune responses against a specific organ are not desired (to prevent the rejection of the tissue or organ grafts necessary to treat burns or traumatic limb/organ loss).

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### Physiologists Use Advanced Technology to Evaluate Carbohydrate Loading in Operational Forces

Scientists at the Naval Health Research Center (NHRC), San Diego, CA are conducting research to test the effectiveness of carbohydrate (CHO) loading in operational forces. For more than two decades, athletes such as marathon runners have used CHO loading, a method of artificially increasing muscle glycogen (a major source of energy in muscles) through exercise and dietary manipulation, to enhance their endurance performance. Studies have demonstrated a strong, positive correlation between pre-exercise muscle glycogen concentrations and exercise duration. Little information exists on the fate of elevated glycogen stores acquired by CHO loading if exercise is not performed. NHRC's research has demonstrated that supercompensated muscle glycogen can be maintained for at least three days in a resting, trained individual. Prior to this study, CHO loading could not be recommended for operational forces because of the possibility that if a military mission were delayed, the elevated glycogen stores might return to normal. NHRC will continue CHO loading research in collaboration with Yale University School of Medicine. Yale is a pioneer in using magnetic resonance spectroscopy (MRS) to determine muscle and liver glycogen concentrations. MRS, a noninvasive offshoot of nuclear magnetic resonance technology, allows for multiple, sequential measures without any of the discomfort or postoperative problems individuals occasionally experience after a muscle biopsy.

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### Vestibular Mobile Field Laboratory Used to Test Low-Frequency Sound Waves on Divers

Researchers at the Naval Aerospace Medical Research Laboratory (NAMRL), Pensacola, FL are taking research to the field in a unique, cost-effective approach using one of their mobile field laboratories (MFL). The Vestibular MFL is designed to go out into the field and collect data related to the human vestibular system, to include balance tests, the vestibular ocular reflex, brain mapping and visual evoked responses. For example, the Vestibular MFL was deployed to the Navy Experimental Diving Unit in Panama City, FL to aid in the testing of the effects of low-frequency sound waves on divers. Combining the expertise of laboratory scientists and staff with all of the MFL's intricate equipment, researchers were able to pinpoint areas of the vestibular system that might be affected by exposure to low-frequency sound waves. Without the Vestibular MFL, much of this research would have been too costly or even impossible to accomplish. A follow-up will be conducted in open water, with the MFL parked on the beach front. In addition to data collection, the assets of the Vestibular MFL can be used to help diagnose and treat a variety of neurological disorders. Parked next to a military medical treatment facility, the MFL could give the facility direct access to a full neurophysiological diagnostic center at a substantial savings. The Vestibular MFL maintains the capabilities of a full neurophysiological test laboratory. In order to assure that all systems on the Vestibular MFL are consistently in top condition, and that tests are performed accurately, NAMRL augments the MFL with its staff of neurologists, psychologists, optometrists, physiologists and specialized technicians. This interaction ensures that top quality science and training occur in the field.

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**"USS Reliance" Christened at  
Brooks Air Force Base, Texas**

High-frequency (HF) energy is transmitted from various shipboard antennas. Antennas are sometimes located near catwalks and occupied work stations aboard ship. On aircraft carriers antennas near the flight deck are rotated to the horizontal position during flight operations. Sometimes, aircraft are parked directly over the antennas during transmission. For some HF frequencies and aircraft, the energy is strongly transmitted and hand-contact can result in very large current flow in the body. To study these situations, the Navy and Air Force built a 60 ft by 60 ft antenna and ground plane transmission system that simulates an aircraft carrier deck. This simulated deck, christened the USS Reliance at Brooks Air Force Base, will allow researchers from the Naval Medical Research Institute Detachment at Brooks to study the health and safety aspects of radiofrequency transmission-induced body and contact currents. The research detachment received tentative approval from Commander, Naval Inventory Control Point Philadelphia, PA for the use of an A4C Skyhawk. The aircraft will be used in current research projects and will be used on the ground plane near a high-power transmitting antenna in the high-frequency band 2-30 MHz. A full-sized human model will be positioned near the aircraft during transmission; both hand-contact current and body-to-ground current will be measured in the human model for many common conditions of ordinance handling and aircraft orientation relative to the antenna. Future use of an F/A-18 was also approved. With aircraft, the carrier-deck simulation is greatly improved and the results can be directly applied to the fleet. [

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**NMRDC Research Unit in Egypt  
Celebrates 50 Years of Dedicated  
Service to the Fleet and Fleet  
Marine Force**

With Sailors and Marines deployed around the world, mission-specific medical research on infectious diseases continues to be one of the Navy's highest priorities. Deployed personnel can be exposed to endemic diseases, many of which are rarely, if ever, encountered by physicians in the United States. The Navy has developed a series of strategically located overseas laboratories to train infectious disease specialists, study disease threats and act as a platform for testing drugs and vaccines against various infectious diseases. The Naval Medical Research Unit Number 3 (NAMRU-3) in Cairo, Egypt was the second laboratory the US Navy established overseas. For the past 50 years NAMRU-3 has studied numerous tropical and subtropical diseases, including enteric diseases, malaria, schistosomiasis, acute respiratory infections, tuberculosis, Q-fever, brucellosis, filariasis, leishmaniasis, meningitis, hepatitis, typhoid fever, parasitic diseases, tetanus, cholera, Rift Valley fever and AIDS. NAMRU-3 personnel were forward deployed for Desert Storm and Desert Shield, and they continue to provide support to fleet assets for multiple exercises, such as Operation Restore Hope and Operation Bright Star. As a recognized leader in infectious disease research, NAMRU-3 has affiliations with over 42 major research, clinical and health organizations throughout the world. These include numerous universities; international and U.S. agencies such as the World Health Organization, the Centers for Disease Control, U.S. Agency for International Development, Veterans Administration, the National Research Council, the Multinational Forces and Observers; various foundations such as the Fulbright Foundation; and the Ministries of Health in Egypt and other countries such as Djibouti, Ethiopia, Yemen, Saudi Arabia, Kuwait, and Syria. NAMRU-3 is a well respected institution in Cairo and has acquired a significant degree of trust and acceptance in this region. The technologically advanced facilities, the access to acutely infected patients in the Abbassia Fever Hospital, and the community-based longitudinal study sites with established field laboratory capabilities make NAMRU-3 a valuable DoD resource as we move into the 21st century and begin a second fifty years in Egypt.

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**Patent Issued to Navy for  
Artificial Horizon Warning  
System for Military Aircraft**

Over fifty percent of tactical aircraft fatalities occur during low altitude maneuvering, sometimes referred to as controlled flight into terrain. Controlled flight (the pilot literally flies the aircraft into the ground or water) mishaps continue despite sophisticated ground proximity detection devices. A Navy patent was recently issued based on research at the Naval Aerospace Research Laboratory (NAMRL) in Pensacola, FL. NAMRL researchers invented an artificial horizon altitude warning system that warns pilots of ground proximity using peripheral visual cues. The warning system includes the projection of an artificial horizon, extending to the limits of the pilot's peripheral vision, superimposed over the actual horizon. Prior to the new system, the minimum time from warning to pilot reaction was approximately 970 milliseconds. With this new system there is no need for eye movement and the reaction time can be reduced to approximately 310 milliseconds. This capacity will significantly decrease pilot reaction time and save lives.

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**Experimental Biochemical  
Decompression for Navy Divers**

Decompression is a dangerous and time-consuming phase of any diving mission. A dive to 190 feet for 40 minutes requires 103 minutes of decompression. On longer dives, decompression can take many hours and possibly be the most hazardous part of the dive. Failure to spend time at an intermediate depth before surfacing can lead to a debilitating illness referred to as decompression sickness (DCS). Treating DCS through recompression requires hours to days, is not always successful in restoring health, and could compromise the

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mission. Researchers at the Naval Medical Research Institute (NMRI), Bethesda, MD are focusing on biochemical concepts for diver decompression. The specific aim of the research is to change the process of decompression, from a passive and empirically-modeled approach, to active biochemical reactions. Biochemical decompression is a novel approach to eliminating the inert gas in a diver's body using non-toxic bacterial enzymes in the intestinal tract to chemically eliminate the gas and accelerate decompression without increasing the risk of DCS. The development of this initial work into an FDA approved product for human use trials is the next phase of study. Human trials are expected in five to seven years.

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<b>Experimental Treatment for Sepsis</b>	In combat, a wounded Sailor or Marine may survive initial blood loss, only to succumb to multiple organ failure due to septic shock. The duration of a "Golden Period" for stabilization and initial treatment represents a crucial time when vigorous medical support must be administered to save lives. Researchers at the Naval Medical Research Institute, Bethesda, MD are investigating bacterial translocation from the gut using a model of hemorrhagic shock to study sepsis following hemorrhage. The aim of the research is to understand and control the effects of shock at the cellular level. Bacteriological cultures of livers, spleen and lymph nodes from mice given selected cytokines had significantly fewer bacteria/gm of tissue than those given saline. Histological examination of intestines revealed restoration of intestinal mucosal integrity following cytokine administration. Further, Doppler flow measurements showed that intestinal ischemia was reversed following oral administration of cytokines. These results suggest that oral administration of selected cytokines may be an important treatment for the prevention of sepsis and septic shock following hemorrhage.
<b>AAALAC Accreditation For Navy Laboratories -- Mission Accomplished</b>	All Naval Medical Research and Development Command laboratories that maintain animals for research and testing are fully accredited by the American Association for the Accreditation of Laboratory Animal Care (AAALAC). This fulfills DoD policy in accordance with DoD Directive 3216.1, "Use of Laboratory Animals in DoD Programs". In June 1995, the Naval Medical Research Institute Detachment in Lima, Peru was the first AAALAC accredited laboratory in South America and the first overseas DoD laboratory so honored in contemporary times. In February, 1996, the Naval Medical Research Unit No. 2 in Jakarta, Indonesia was the first laboratory in Southeast Asia to earn accreditation. Also in February, the Naval Medical Research Unit No. 3 in Cairo, Egypt was the first laboratory in Africa to earn accreditation. Again in February, the Naval Medical Research Institute in Bethesda, MD was the largest of the Navy laboratories to earn accreditation. Full accreditation continues for the Naval Dental Research Institute in Great Lakes, IL; the Naval Medical Research Institute Detachment at Brooks AFB, TX; and the Naval Medical Research Institute Toxicology Detachment at Wright-Patterson, AFB, OH. CAPT T.N. Jones, Commanding Officer of the Naval Medical Research and Development Command said, "I am proud of my Commanding Officers and Officers in Charge whose vision and perseverance made these 'firsts' in the DoD possible. No less pride is felt for our 'ships companies' consisting of veterinarians, technicians, animal caretakers and scientific and administrative support staffs. These teams of American and Foreign Service Nationals in every laboratory met the extremely high standards of AAALAC, gaining long overdue recognition for their outstanding animal care and use programs which conduct the vital military-relevant research supported by the Navy and the DoD." AAALAC, with offices in Rockville, MD, is a nonprofit, nonregulatory, voluntary organization formed by biomedical and scientific organizations in 1965 to accredit animal care and use activities in private and public research institutions. Accreditation is widely accepted in the scientific community and the Association is highly respected as an independent organization that evaluates programs through site visits, peer review, self-assessment and continuing program reviews.
<b>C.W. Bill Young DoD Marrow Donor Program Holds Drives at the Air Force Academy</b>	The Naval Medical Research Institute's C.W. Bill Young DoD Marrow Donor Program held a series of marrow donor drives at the U.S. Air Force Academy from 29 April through 2 May, 1996. This was the largest bone marrow donor drive in the history of the DoD marrow donor program. More than 2,000 people were tested as potential bone marrow donors for Air Force Academy Cadet Brian Bauman. Brian Bauman, a senior, was diagnosed with chronic myelogenous leukemia. What makes Cadet Bauman's case unique is that he is of Asian (Korean) heritage and was adopted at age 3 by Steve and Elaine Bauman of Pine City, Minnesota. The possibility of finding a family member bone marrow match was severely reduced in Cadet Bauman's case, and, due to the relatively low number of Asians enrolled in the National Marrow Donor Registry, his chances of finding an unrelated match are similarly reduced. Cadet Bauman needs a marrow transplant if he is going to live -- a fact not lost on his fellow cadets and the staff of the Air Force Academy. In record time, the cadets (with the approval of the Academy's Superintendent), organized a bone marrow donor drive to demonstrate their support for Cadet Bauman and all other victims of life-threatening blood disorders. Over 2,000 volunteers -- cadets, civilians, and DoD personnel -- enrolled in the National Marrow Donor Registry during the drive. To date, more than 100,000 people have enrolled in the DoD program. At present, over 304 DoD volunteers have donated bone marrow, and the number is growing by more than two persons every week. According to CAPT Robert Hartzman, MC, USN, head of the DoD Marrow Donor Program, "The DoD program serves the nation in two ways. First, we are the contingency resource for soldiers, Sailors, Marines and airmen, should they ever become the casualties of chemical or radioactive agents which leave them in need of urgent tissue typed blood platelet support or an urgent bone marrow transplant. Second, we are able to assist in saving lives on a daily

**Naval Medical Research and Development Command**  
**1996 Command History**

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basis by arranging for our DoD volunteers to be bone marrow donors. This daily effort on the part of our DoD volunteers is probably the most rewarding aspect of the entire program -- to know that there are so many people who genuinely care about their fellow Americans."

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**NMRDC Sponsors the First  
Medical Technology Initiatives  
Game at the Navy War College**

To meet readiness requirements, medical research and development products are an essential element in planning future Navy-Marine Corps operations. Wherever the Fleet or Fleet Marine Forces go in the next century, Navy medical research and development will have already been there. This venture into the future, scheduled for August 1996, will begin with the first medical technology initiatives game played at the Navy War College in Newport, RI. This game is designed to provide realistic scenarios that center on new medical technology that may influence future readiness capabilities at the strategic, theater, and force levels. The game will feature two scenarios: a limited regional conflict and a humanitarian operation. Within these two scenarios, environmental threats (e.g., cold, heat, night operations); operational threats (e.g., chemical biological warfare, lasers, information war); and the handling and treatment of disease, non-battle injuries, and combat casualties in the year 2015+ will be considered. The purpose of the technology initiatives game is to identify emergent medical technologies (e.g., telecommunications, expert systems, remote imaging systems, artificial intelligence, artificial blood, multi-valent vaccines, CBW detectors) that will enhance operational readiness. The outcomes of the game will lead to a validation, understanding and preservation of medical requirements within the requirements determination process of DoN and DoD and an understanding of the negative consequences of failing to incorporate medical requirements in future operational planning.

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**Tri-Service Ocular Study**

Personnel in military and civilian occupational settings operate a vast array of microwave emitting devices. Considering the number and kind of devices in the Navy, Army and Air Force and in the civilian sector, there is an increased risk of accidental exposure to microwave energy. The technological advances over the past 30 years have increased the output power of microwave emitters several fold and have added to the exposure concern. Researchers representing the three services (Navy, Army, Air Force) at the Tri-service Directed Energy Bioeffect Research Complex at Brooks AFB, San Antonio, TX, are focusing on this issue. The primary objective of a current two year study is to determine if time-averaged relatively low power microwaves in the form of high peak power pulses will cause ocular damage. If the reported eye damage does occur at low level microwave exposure, the current DoD and civilian safety standards for microwave exposure of personnel will have to be re-evaluated and could become more restrictive. Restrictive microwave standards can impact on military operational readiness by denying personnel access near high power emitters.

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**The Naval Biodynamics  
Laboratory Assembles a Time  
Capsule**

The Naval Biodynamics Laboratory (NBDL), New Orleans, LA will close on 30 September, 1996 following the recommendations of the 1995 Base Realignment and Closure (BRAC) Commission. For nearly three decades research on the mechanical forces encountered by military personnel has been the focus of the laboratory's efforts. The data from this research is used to determine human tolerance levels to these forces, to develop mathematical models, to improve test manikins, and to enhance human response to impact. Studies at the laboratory include use of a vertical accelerator which simulates aircrew ejections and a horizontal accelerator which simulates crashes. The ship motion simulator and a tri-axial tilt/rotation chair with a visual affects device are used to study the effects of motion on performance. In anticipation of the closure the NBDL staff is creating a time capsule of the laboratory's memorabilia. The staff includes military and civilian scientists, engineers and technicians and a cadre of Sailors who have volunteered to be experimental subjects in the command's research programs. Examples of the capsule's contents include unique items ranging from mouth mounts (used for acceleration experiments), T-plates (devices that contain accelerometers and photo targets for tracking during impact acceleration), pelvic mounts (track impact), photographs (both scientific and special command events), official documents, technical reports and Mardi Gras beads. The time capsule will be preserved by the Naval Historical Center, Curator for the Navy, Washington, DC.

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**NHRC Researchers Lend a  
Helping Hand to the NTSB Team  
Investigating the ValuJet Crash**

The Naval Health Research Center (NHRC), located in San Diego, California, is providing technical assistance to the National Transportation and Safety Board (NTSB) as the crash site investigation of ValuJet Flight 592 continues in the Florida everglades. In coordination with the Navy Science Assistance Program (NSAP), researchers from NHRC are sharing information and technology with the NTSB. This includes methodologies and equipment used to protect Navy and Marine Corps personnel, who frequently operate for extended periods in adverse environments and in protective clothing ensembles which increase body temperature. At the request of the NTSB and Susan Bales, Director of NSAP, Jay Heaney, a research physiologist at NHRC, has flown to the crash site with 13 Steele Ice Vests™. Heaney will brief the divers and ground-based personnel on the proper use of the ice vests to reduce thermal stress and extend stay times. These ice vests have been proven effective by NHRC in military situations such as the Persian Gulf, firefighting, and damage control

operations, and are now in the inventories of most Navy ships. As is true of Service personnel in many military operations, the civilian investigators at the crash site are operating at the upper limits of human endurance and environmental extremes. The assistance being provided by NHRC, part of the Naval Medical Research and Development Command, will contribute measurably to the accomplishment of this enormous and difficult task.

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**Research Results Hint at  
Potential White Blood Cell  
Transfusion Therapy**

White blood cells form the basis of the immune system. Failure of the immune system can lead to increased susceptibility to infection and disease as in the case of patients with HIV infection. A research team from the Naval Medical Research Institute (NMRI), Bethesda, MD, has discovered a new method that permits growth of white blood cells (specifically CD 4 T cells) in the laboratory using blood from patients with HIV infection. The team, made up of Navy, Army and civilian immunologists and virologists, discovered a method of triggering a cascade of biochemical reactions allowing white blood cells to grow 8,000 fold and at the same time dramatically decreasing the amount of HIV in the cell cultures. An FDA phase I clinical trial to test the safety and feasibility of a transfusion therapy is planned to begin at NMRI. This discovery may lead to the development of a new therapeutic option for patients with HIV infection and for patients with other forms of immune deficiencies or cancer. Patients could receive transfusions of white blood cells similar to other blood bank transfusion procedures.

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**Research Reduces Recruit  
Training Injuries and Costs**

Musculoskeletal injuries are the most common injury for those who participate in sports and exercise. These injuries are a leading cause of patient visits, lost training time, and reduced operational readiness in military forces. At the Marine Corps Recruit Depot, San Diego, research demonstrated an annual loss of 53,600 injury-related training days at a cost of \$16 million. A research team from the Naval Health Research Center, San Diego, is working closely with Marine Corps, Navy, and Special Operations personnel on an aggressive program to reduce the incidence of musculoskeletal injuries. The team includes Navy sports medicine and operational experts and research partners from Johns Hopkins University, University of California, and Children's Hospital, San Diego. This program includes data collection systems at major training facilities that document the incidence and nature of injuries, risk factor profiles for injury susceptibility, and interventions to reduce injuries. For example the team used dual-energy X-ray absorptiometry to derive structural bone geometry as a potential predictor of stress fractures. This and other information derived from the injury monitoring program has led to the development of scientifically-based interventions to reduce injuries at the Marine Corps Recruit Depot. An evaluation of this program demonstrated an overall reduction in overuse injuries and a 50% reduction in stress fractures, with no decrement in physical fitness at graduation. Current efforts are focused on the development of improved footwear and expanding the program to include the Naval Recruit Training Center, Great Lakes, the Marine Corps Recruit Depot, Parris Island and various operational commands.

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**The Naval Biodynamics  
Laboratory Closes After 26  
Years In New Orleans**

In a formal ceremony recognizing 26 years of service the Naval Biodynamics Laboratory (NBDL) was decommissioned and the facilities transferred to the University of New Orleans (UNO). The laboratory became the National Biodynamics Laboratory (NBDL) under the management of the UNO College of Engineering. The Naval Biodynamics Laboratory, located in NASA's Michoud Assembly Facility, was identified for closure under the Base Realignment and Closure Act in 1995. Since 1971, the laboratory has served as an important Navy activity conducting biomedical research on the effects of mechanical forces (motion, vibration, and impact) encountered by naval personnel on ships and in aircraft. Researchers established human tolerance limits for naval platforms and developed preventive and therapeutic counter measures for personnel to maintain optimal performance. The laboratory houses several unique "man-rated" test devices and facilities to support the research programs. Major devices include a 700 foot horizontal accelerator, a 36 foot vertical accelerator and a ship motion simulator capable of Sea State 5. The significant benefits of the transfer of NBDL to UNO include the enhancement of biomedical research capabilities through collaborative work between UNO and the Louisiana State University Medical Center, continued employment opportunities for staff members with the new NBDL, continued analysis of the extensive research databases, and access of the unique research testing devices by DoD.

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**VANGUARD 96 -- A Great  
Success**

VANGUARD 96, sponsored by the Naval Medical Research and Development Command and the Naval War College was the first medical science and technology initiatives game of its kind. The game brought together members of the medical, the line and the science and technology communities to focus on future naval capabilities in the year 2015 and beyond. Game players were divided into four focus areas (NBC/Infectious Diseases, Combat Casualty Care, Military Operational Medicine with an emphasis on the environmental aspects, and

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Military Operational Medicine with an emphasis on the human performance aspects ) and tasked, as members of a Joint Task Force, to conduct a mission analysis and develop concepts of operations for two scenarios ( a lesser regional contingency in the Middle East and an operation other than war involving a major earthquake in the Java Sea off Indonesia). VANGUARD 96 accomplished the major objectives of the game which included investigating wargaming's role in the medical requirements identification process, increasing the operational planner's sensitivity to medical support as a force multiplier, identifying emergent medical technologies that will enhance fleet capabilities, and recommending approaches for improving involvement of industry and academia. VANGUARD 96 and future VANGUARD games will be valuable as tools for Navy medicine to envision and plan for the future.

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**Researchers Develop A Human Factors Model For Aviation Mishaps**

The Naval Safety Center looks at safety information to discern mishap indicators. These indicators highlight conditions that have the potential to result in an aviation mishap. Human factors has been identified in 80% of aviation mishaps. A team of naval aerospace psychologists, working with the Naval Safety Center, developed a human factors model to investigate prevention techniques and performance enhancements to deter aviation mishaps. The model was applied to the Safety Center's databases which include findings and recommendations from Mishap/Hazard Reports, comparative studies, and specific issue analysis ( e.g., F-14 mishap study). The model represents the relationship between personnel conditions (i.e. improper flight scheduling, self-medicating, exceeding crew rest) and preflight factors. The application of this model allows for the development of effective intervention methods. Proactive use of intervention strategies will enhance combat readiness through the preservation of personnel and equipment

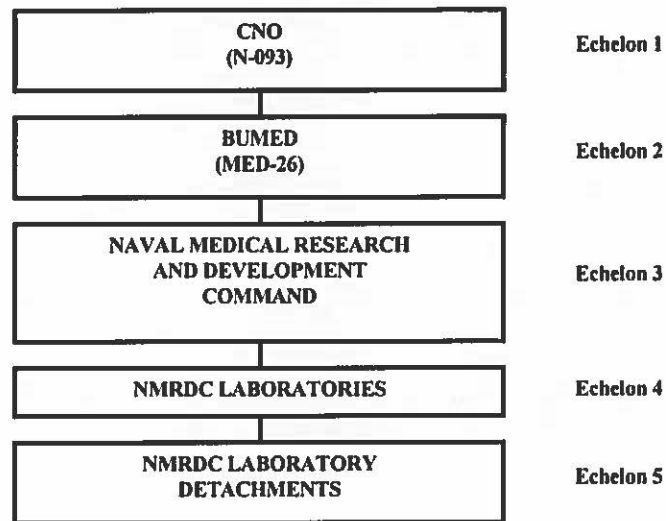
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**NMRI and CRADA Partner Complete Phase I Clinical Trials of Campylobacter Vaccine**

Campylobacter is a bacteria that causes approximately 400 - 500 million cases of gastroenteritis and diarrhea throughout the world each year. Also, Campylobacter is considered to cause one of the most severe forms of travelers' diarrhea. The Naval Medical Research Institute, Bethesda, MD is a partner in a Cooperative Research and Development Agreement (CRADA) with MicroCarb Inc. of Gaithersburg, MD and they have successfully completed a clinical trial that demonstrated the safety and immunogenicity of a Campylobacter vaccine. The CRADA partner's research focuses on inhibiting the growth of bacteria by developing a vaccine that interrupts the process by which bacteria grow utilizing nutrients at the mucosal surface. The vaccine provides prevention and treatment because it interrupts the process by which bacteria infect healthy cells at the initial stages of infection. The Navy will continue to support MicroCarb's vaccine development through the clinical stages because it holds great potential to the operational readiness of deployed military personnel.

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Naval Medical Research and Development Command  
Organizational Structure



The Commanding Officer, NMRDC, is subject to the area and regional coordination authority of the Commandant, Naval District Washington, DC. The National Naval Medical Center provides host support.

Functions of the Commanding Officer, NMRDC, as directed by the Chief, Bureau of Medicine and Surgery (BUMED): (taken from the BUMED 26 homepage)

- Assists higher authorities in identifying, defining, and communicating requirements for medical and dental RDT&E to be performed under the purview of BUMED.
- Provides funding guidelines and program objectives to the Naval Medical Research and Development Command and acts as their program manager.
- Serves as liaison with resource sponsors to coordinate program planning and execution and to provide funding allocations.
- Ensures that advanced development and acquisition programs are coordinated with BUMED codes responsible for program approval, logistics, manpower, test and evaluation, and procurement.
- Provides timely replies to congressional and other inquiries regarding naval medical research and development matters
- Develops and maintains program documentation to include, but not limited to, research and development descriptive summaries, tentative medical requirements, tentative operational requirements, and non-acquisition program definition documents.
- Directs and monitors assigned Medical Department responsibilities concerning the use and protection of human and animal subjects used in research, development, test, and evaluation studies conducted by, within, or for DoN.
- Identifies requirements and provides guidance concerning recruiting, selecting, training, and assignment of R&D community personnel.

Component Activities

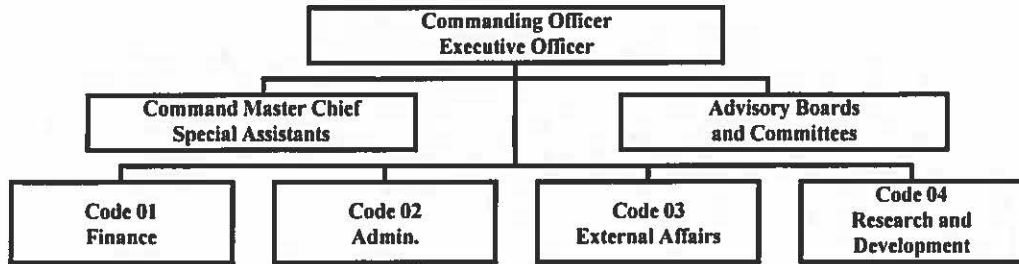
Echelon 4

- Naval Aerospace Medical Research Laboratory, Pensacola, FL
- Naval Dental Research Institute, Great Lakes, IL
- Naval Health Research Center, San Diego, CA
- Naval Medical Research Institute, Bethesda, MD
- Naval Submarine Medical Research Laboratory, Groton, CT
- U. S. Naval Medical Research Unit No. 2, Jakarta, Indonesia
- U. S. Naval Medical Research Unit No. 3, Cairo, Egypt

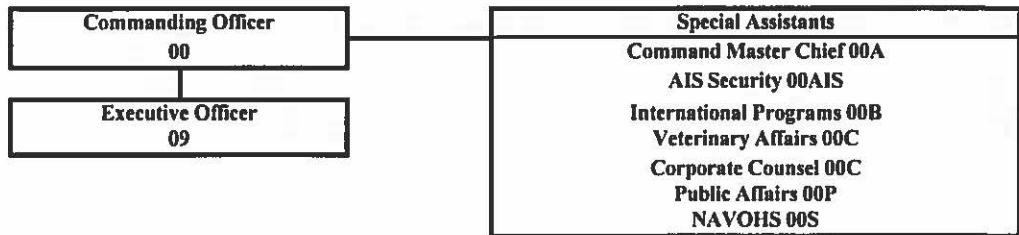
Echelon 5

- Naval Dental Research Institute Detachment, Bethesda, MD
- Naval Medical Research Institute Detachment, Lima, Peru
- Naval Medical Research Institute Toxicology Detachment, Wright-Patterson Air Force Base, OH
- Naval Medical Research Institute Detachment, Brooks AFB

### NMRDC Command Organization



### Office Of The Commanding Officer (00)



The Commanding Officer is tasked with the responsibility for effective and economical organization and management of Medical Department RDT&E programs. The Commanding Officer has authority to fulfill the duties and obligations prescribed in current manuals, orders, regulations and directives. The Commanding Officer, at his discretion, and when not contrary to existing laws or regulations, may delegate authority to subordinates to execute assigned tasks. This delegation of authority will in no way relieve the Commanding Officer of the responsibility for the safety, well-being, and effectiveness of the Command.

In the Temporary absence of the Commanding Officer, The Executive Officer will act as the Commanding Officer. In the temporary absence of both, the Department Director next in rank and seniority, who is permanently assigned to the Command will act as the Commanding Officer.

### Special Assistants to the Commanding Officer

#### Command Master Chief (00A)

- Assists and advises the Commanding Officer on all enlisted personnel matters.
- Assists and advises Echelon IV Commanding Officers and Echelon V Officers-in-Charge on enlisted personnel matters with emphasis on enlisted personnel development, distribution and utilization throughout the spectrum of RDT&E mission execution.
- Coordinates with Command Master/Senior Chiefs of the Echelon IV and Echelon V activities to ensure that morale, personnel services, and welfare are maintained at the highest possible level.
- Maintains close liaison and coordination with the Force Master Chief of the Navy Medical Department and with the Enlisted Personnel Distribution Branch of the Bureau of Naval Personnel (BUPERS).

#### Special Assistant for AIS Security (00AIS)

- Serves as the Command's Automated Information Security (AIS) Officer for all matters regarding the protection of AIS, networks, and computer resources against accidental or intentional destruction, unauthorized disclosure, denial of service, and unauthorized modification.
- Ensures compliance with all applicable regulations and policies concerning the procurement and maintenance of AIS.

#### Special Assistant for International Affairs (00B)

- Serves as the principal Command point-of-contact for OCONUS field activities.
- Advises the Commanding Officer on OCONUS administrative and programmatic issues.
- Coordinates OCONUS laboratory activities with appropriate State Department, Department of Defense (DoD), CNO, and BUMED officials.
- Is a collateral duty function of the Research Area Manager for Infectious Diseases.

#### Special Assistant for Veterinary Medicine (00C)

- Assists and advises the Commanding Officer on veterinary medicine and animal care and use matters.
- Assists and advises Echelon IV Commanding Officers and Echelon V Officers-in-Charge on the operation of an effective animal care and use program.

- Conducts Command Inspection visits to ascertain compliance with all Federal, DoD, and Navy animal care and use regulations and guidelines.
- Maintains liaison with Office of the Chief, U. S. Army Veterinary Corps to achieve adequate veterinary personnel staffing.

**Corporate Counsel (00CC)**

- Serves as an Attorney within a component office of the Office of the General Counsel of the Navy and as the principal advisor to the Commanding Officer for matters related to inventions, patents and cooperative agreements with other governmental and commercial organizations.
- Assists and advises Echelon IV Commanding Officers and Echelon V Officers-in-Charge on matters related to inventions, patents and cooperative agreements with other governmental and commercial organizations.
- Provides legal advice and services to NMRDC Offices and the offices of the subordinate commands on various issues arising from the operation of a medical research program.

**Office of the Executive Officer (09)**

- The primary function of the Executive Officer is to assist and advise the Commanding Officer in all matters that pertain to the mission of the Command. All orders issued by the Executive Officer shall be regarded as proceeding from the Commanding Officer and shall govern all persons within the Command.

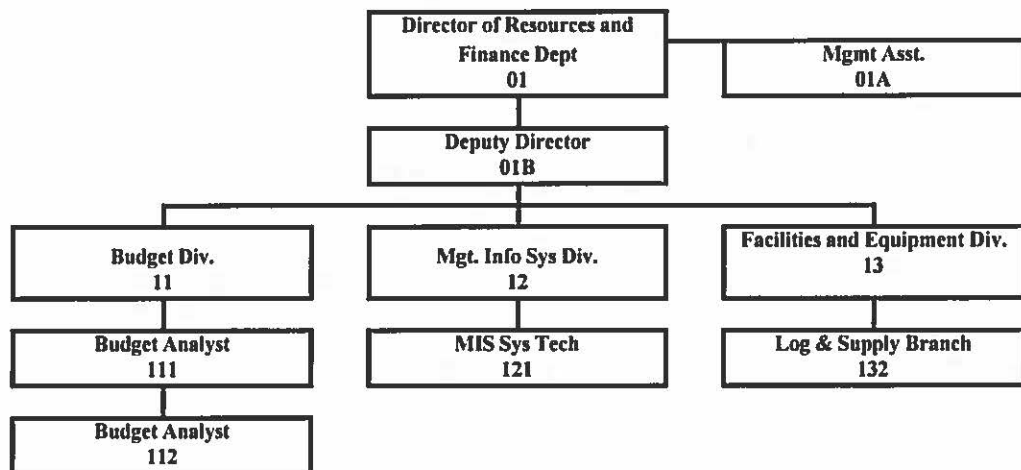
**Special Assistant for Public Affairs (00P)**

- Develops, writes, edits, and supervises all stages of the preparation of promotional and recruiting materials for the Command and its subordinate laboratories. These materials include a regularly published Newsletter, and various feature articles on subjects related to the programs or operation of the Command or its subordinates.
- Develops and updates as necessary, Command briefing packages and Annual Reports to sponsors.
- Assists in the planning and arrangements for Command meetings, conferences and functions.
- Serves as the principal Command point of contact for interactions with the news media and general public regarding the programs of the Command. Acts as liaison with the Public Affairs Offices of other Navy and governmental activities.

**Special Assistant for NAVOSH (00S)**

- Advises the Command on oversight responsibilities to ensure that Echelon IV and V commands are in compliance with Navy Occupational Safety and Health Inspection (NOSHIP) deficiency abatement programs.
- Advises subordinate commands on matters pertaining to Navy Occupational Safety and Health (NAVOSH).
- Reviews and consolidates subordinate commands' NAVOSH and NOSHIP reporting requirements with a focus on identifying trends for actions required in support of laboratory safety and health programs.
- Serves as the Command Safety Officer.

**Office Of The Director Of Resource Management And Finance Department (01)**



**Director of Resource Management/Comptroller (01)**

- The Director of Finance/Comptroller reports directly to the Commanding Officer through the Executive Officer, and serves as the principle staff advisor to the Commanding Officer in the interpretation of guidance from higher authority to effectively direct, manage, and coordinate the provision of financial, and manpower resources for the headquarters and subordinate commands. Assists the Commanding Officer in monitoring and managing subordinate commands and activities in the areas of resource allocation, facilities and supply matters. Advises and assists the Commanding Officer in responding to higher authority concerning budgets and the execution of resources.
- Appointed in writing as the Command Allotment Administrator and acts as Program Element Manager for RDT&E,N Program Element 65861, "Management Support" and "65862 Naval Medical Instrumentation & Material Support".

- Organizes approved financial plans into fiscal programs and provides recommendations on major alternatives using financial data to enhance the program decision process and insure maximum use of available resources.
- Prepares the Medical Department RDT&E budget by coordinating fund estimates and justifications for resources.
- Develops and maintains budgetary data acquisition and retrieval systems.
- Maintains fiscal controls based on reprogramming actions.
- Maintains liaison with organizations involved in RDT&E budget formulation and execution i.e. CNO, Office of Naval Research (ONR), and BUMED.
- Monitors field activity performance for compliance with proposed financial plans and recommends funds authorization adjustment as necessary.
- Provides BUMED-01 with programming data for RDT&E projects that will become operational and affect O&M,N funding.
- Manages manpower functions related to budget formulation and execution which include: management of total force manpower allowances, coordination of program objectives memorandum (POM) issues, manpower change requests, manpower issues in conjunction with commercial activities (CA), efficiency review (ER) programs and staffing standards.
- Oversees and coordinates the maintenance of civilian time and attendance records, submission of these records to Naval Regional Finance Center, and assistance of employees in interactions with Finance Center personnel regarding leave and pay issues.

**Management Assistant to the Director of Resource Management and Finance Department (01A)**

- Provides administrative support to the Director, Deputy Director and Budget Analysts for the Resource Management and Finance Department. Provides administrative support for the Director and the AIS Systems Technician of the Automated Information Systems Division, and the Director of the Facilities and Equipment Management Division.

**Deputy Director of Resources and Finance Department (01B)**

- Supervises personnel assigned to the Department.
- Assumes the duties and responsibilities of the Director when the Director is absent from the Command. When acting in that capacity, the Deputy shall have full authority to function on behalf of the Director.
- This position will normally be a collateral assignment of the Budget Officer.

**Budget Division (11)**

**Budget Officer (11)**

- Coordinates and analyzes program planning documents from higher authority, assembles medical RDT&E planning data and submits required SYDP input.
- Translates approved programs into a financial plan and formulates annual supplemental and special estimates for submission by the Commanding Officer.
- Requests estimates of fiscal requirements from field activities and program managers, reviews and analyzes their response, and prepares budgets estimates, special exhibits, justification material as directed by higher authority.
- Maintains status of funds control in the budgetary execution process.
- Responsible for the management of Managing to Payroll policy for the Command and the subordinate activities.
- Supervises personnel assigned to the Budget Division.
- Serves as the Naval Medical Research and Development Command Timekeeper, and maintains all records associated with this position.

**Budget Analysts (111) and (112)**

- Coordinates and analyzes program planning documents, assembles medical RDT&E planning data for review by budget officer.
- Translates approved programs into a financial plan and formulates annual supplemental and special estimates for submission to the Budget Officer.
- Requests estimates of fiscal requirements from field activities and program managers, reviews and analyzes their response, and prepares budgets estimates, special exhibits, and budget justification materials.
- Maintains status of funds control in the budgetary execution process.

**Automated Information Systems Division (12)**

**Director Automated Information Systems Division (12)**

- Manages all Automated Information Systems (AIS) for the Command.
- Directly manages AIS functions including the development of policies and programs involving the procurement, distribution, utilization and maintenance of AIS equipment.
- Serves as the Command AIS Security Officer.

**AIS Systems Technician (121)**

- Provides AIS technical support to all departments.

**Facilities and Equipment Management Division (13)**

**Director of Facilities and Equipment Management (13)**

- Acts as Assistant Program Element Manager for RDT&E,N Program Element 65862N, "Navy Medical Instrumentation and Material Support."

- Manages the facilities planning, programming, and budgeting actions. Monitors program execution for Military Construction, Facilities Special Projects and the Shore Facilities planning System.
- Serves as liaison with NNMCM Public Works Division for NMRDC required alteration, construction, or repair special projects, excluding routine repair and maintenance trouble calls.
- Assists the Administrative Officer with NMRDC space assignments and any facility alterations and utility service changes.
- Manages the general purpose equipment planning, programming, and budgeting actions. Monitors program execution of equipment procurement, utilization, and redistribution. Justifies and initiates procurement of general purpose equipment for NMRDC.
- Manages, coordinates and directs the provision of supply and logistics support to the Command, ordering and processing the delivery of non-expendable supplies, maintaining the Plant Property and Minor Property Accounts, and obtaining and managing the stock of expendable supplies for the Command.
- Directs all operating management support for the efficient operation of the facilities of the Command including space utilization management, provision and service of utilities in the Command offices, management and coordination of necessary minor repairs to utilities or equipment. This office has primary responsibility for general coordination with the host Command for services provided under the Host/Tenant agreement.
- Provides necessary coordination for the submission for information, or the proper review and approval of manuscripts generated in the subordinate laboratories.
- Manages the Information System Program (ISP) for NMRDC and subordinate activities. Serves as liaison with Naval Medical Information Management Center (NMIMC) for RDT&E automated data (ADP) processing matters. Serves as the Executive Agent for NMRDC ISP Policy Board, the NMRDC ADP Security Officer and the manager of in-house ADP assets.

#### Facilities and Equipment Division (13)

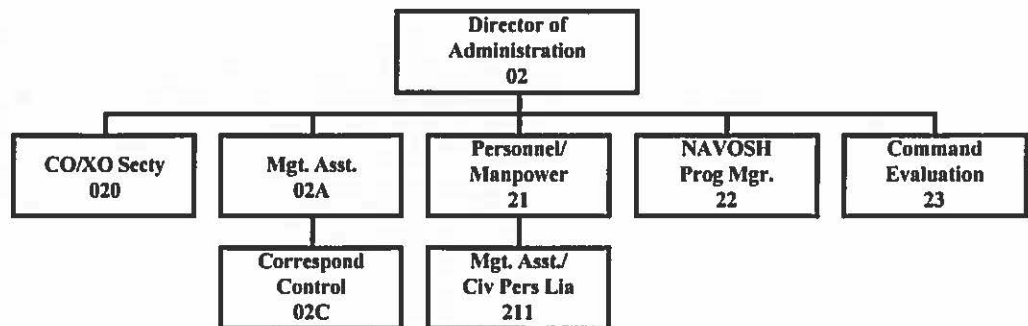
##### Facilities and Equipment Management Branch (131)

- Assists the Director of Facilities and Equipment Management in the management and oversight of facilities, equipment, and information systems, with primary emphasis on facilities planning.
- Assumes the duties and responsibilities of the Director in his absence. As the acting Director, He/she shall have full authority to function in behalf of the Director in all facilities, equipment, and information system matters.

##### Logistics and Supply Branch (132)

- Provides supply and logistics support to the Command, ordering and processing the delivery of non-expendable supplies, maintaining the Plant Property and Minor Property Accounts, and obtaining and managing the stock of expendable supplies for the Command.
- Provides operating management support for the efficient operation of the facilities of the Command including space utilization management, provision and service of utilities in the Command offices, management and coordination of necessary minor repairs to utilities or equipment. Provides general coordination with the host Command for services provided under the Host/Tenant agreement.

#### Office Of The Director Of Administration (02)



##### Director of Administration (02)

The Director for Administration provides a full range of administrative, personnel and managerial guidance for the entire Command and subordinate activities. The Director for Administration is the principal staff advisor to the Commanding Officer, Executive Officer, other Directorates, and subordinate commands for all matters, related to the Command Personnel and Administrative Management; provides administrative and organizational guidance in all administrative management matters, including general administration, personnel administration, disciplinary/legal proceedings, correspondence and records management, recurring reports, command organization, and manpower management. The Director for Administration serves as the Command Security Manager. The Directorate for Administration consists of the Personnel Division.

##### Commanding Officer's Secretary (020)

- Serves as the executive secretary for the Commanding Officer, Executive Officer and the Command Master Chief.

**Management Assistant (02A)**

- Supervises the management of the Command Correspondence Control and Command Records System.
- Provides administrative support to the Director of Administration.
- Serves as the custodian of Command classified materials.

**Correspondence Control (02C)**

- Manages the Command Correspondence Control and Command Records Systems. Provides advice and assistance to the Command on all matters pertaining to the receipt, tracking and processing of all Command correspondence, message traffic and the maintenance of necessary Command files.
- Manages and maintains the Command Directives System.
- Oversees the operation of the general office functions of the Command.
- Processes all military leave, military pay and disbursing actions.
- Updates and maintains the Standard Personnel Management System (SPMS) for the Command and subordinate commands.

**Personnel Division (21)**

**Division Director (21)**

- Manages, coordinates and directs administrative support to the Command for all military personnel matters including the maintenance and administration of military personnel records, processing of military leave, all aspects of the administration of travel and travel claims, military pay and disbursing actions, processing of military awards, coordination of transfers and other actions with the Bureau of Naval Personnel (BUPERS), and other routine personnel correspondence and actions.
- Manages, coordinates and directs administrative support to the Command for all civilian personnel matters including the civilian personnel classification, recruitment, promotion or termination processes; coordination of civilian employee relations programs; processing of civilian evaluations and incentive awards, processing of routine civilian personnel actions, training activities, and implementing various Navy-wide personnel programs in coordination with BUMED and other appropriate offices.
- Advises the Commanding Officer and subordinate commands on policies and procedures that govern the assignment, distribution and utilization of officer, enlisted and civilian personnel.
- Maintain liaison and close coordination with BUPERS and BUMED on matters which affect the assignment and distribution of military personnel.
- Evaluates field activity Position Management Programs and develops recommendations to improve their position management performance.
- Manages the Command's mobilization planning and contingency readiness program, reviewing all documents from fields activities, and responding to requirements of higher authority as necessary.

**Management Assistant/Civilian Personnel Liaison (211)**

- Coordinates the administrative support to the Command for all military personnel matters, including:
  - All necessary coordination with the Personnel Support Detachment, Bethesda for the maintenance and administration of military personnel records, all aspects of the administration of travel and travel claims.
  - All internal Command support to attached personnel and personnel of the subordinate laboratories for processing of military awards, coordination of transfers and other actions with the Naval Military Personnel Command, and other routine personnel correspondence and actions.
- Manages, coordinates and directs administrative support to the Command for all aspects of civilian and military Temporary Additional Duty travel including the preparation of orders; country clearance procedures, where required; and the necessary interactions with the Personnel Support Detachment, Bethesda for obtaining tickets and advanced per diem and for the processing of travel claims.
- Coordinates the administrative support to the Command for all civilian personnel matters, including:
  - All necessary coordination with the Human Resources Office, Washington (HRO-W) for administration of the civilian personnel classification, recruitment, promotion or termination processes; coordination of civilian employee relations programs; and processing of civilian evaluations and incentive awards.
  - All internal Command support to civilian employees of the Command and those of the subordinate laboratories for processing of routine civilian personnel actions, training activities, and implementing various Navy-wide personnel programs in coordination with BUMED and other appropriate offices.
- Provides administrative support to the division Director.

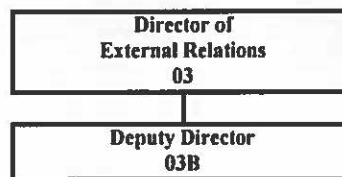
**NAVOSH Program Manager (22)**

- Advises the Command on oversight responsibilities to ensure that Echelon IV and V commands are in compliance with Navy Occupational Safety and Health Inspection (NOSHIP) deficiency abatement programs.
- Advises subordinate commands on matters pertaining to Navy Occupational Safety and Health (NAVOSH).
- Reviews and consolidates subordinate commands' NAVOSH and NOSHIP reporting requirements with a focus on identifying trends for actions required in support of laboratory safety and health programs.
- Serves as the Command Safety Officer.

**Command Evaluation Division (23)**

- Manages, coordinates, and directs the Management Control, Command Evaluation, and Naval Command Inspection programs of the headquarters command and field activities. Provides advice and assistance to the Command on all matters pertaining to these programs.
- Coordinates and conducts management control reviews on programs/functions with potential for waste, fraud, and abuse.
- Evaluates the effectiveness of field activities Management Control, Command Evaluation, and Naval Command Inspection programs. Develops recommendations in response to noted program deficiencies and ensures that corrective actions are implemented in a manner consistent with the intent of stated recommendations.
- Coordinates and tracks field activity responses to Command Inspection Team recommendations and monitors compliance with all external review and inspection processes of NMRDC field activities.
- Advises Echelon IV and Echelon V command on matters pertaining to the Command Evaluation, Management Control, and Naval Command Inspection programs.

**External Relations Department (03)**



**Director of External Relations Department (03)**

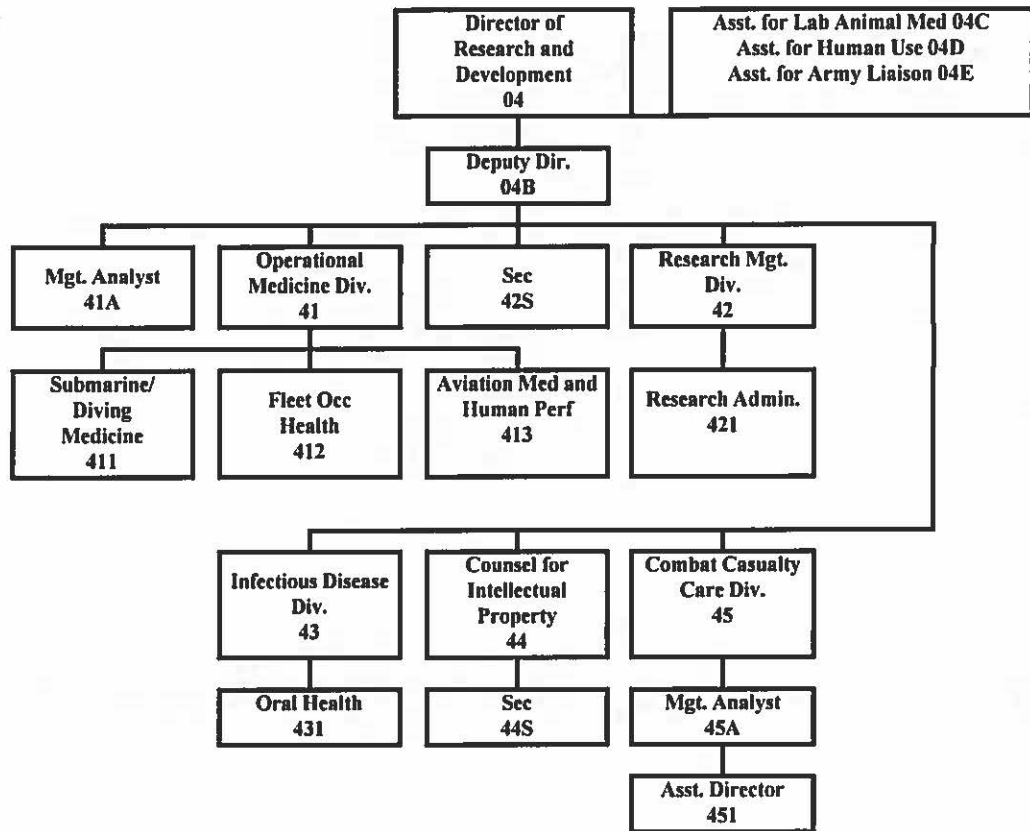
- Serves as the Command point of contact for all issues regarding the long-range and strategic planning of the Command's RDT&E programs, external relations with military and civilian agencies, and the integration of these plans with the total operations of the headquarters and the individual laboratories.
- Analyzes current Navy medical needs, and the ability of NMRDC to meet those needs through in-house and contract programs and within the constraints of projected resources and scientific capabilities. Develops and maintains the currency of the Command's long-range corporate goals and marketing objectives for the research program, and provides direction and guidance to the laboratories in the development of their individual long-term plans.
- Defines, plans and facilitates the appropriate integration of biomedical aspects of advanced and developing Navy weapons systems in NMRDC programs, and coordinates these programs with other Navy and Contract RDT&E organizations.
- Serves as the Command liaison with the DoD Laboratory and Research Center community, the Navy requirements and technical communities, the academic engineering community, the Fleet, and industry.
- Serves as the Command representative to the Navy Science Assistance Program (NSAP), to ensure the timely transfer of pertinent Fleet operational problems to the biomedical research community, and to facilitate full NMRDC and laboratory response to these issues.
- Serves as the Command representative for legislative affairs.
- Serves as the Command point of contact for technology transfer.

**Deputy Director of External Relations (03B)**

- Plans and develops a wide variety of reports, briefs and publications concerning the activities of the Command and its laboratories.
- Develops informational and communication marketing strategies for program sponsors and external customers.
- Monitors the media for issues pertaining to medical research and development.
- Serves as the Special Assistant for Public Affairs.



Office Of The Director Of Research And Development (04)



**Director of Research and Development (04)**

- Directs the development, management, evaluation and documentation of in-house and contract RDT&E programs in response to identified Navy and Marine Corps needs and requirements.
- Formulates budgets for Research, Exploratory Development, Advanced Development and Engineering Development programs.
- Exercises research program quality control and assures responsiveness to RDT&E needs through the establishment, management, and support of review panels and technical workshops.
- Directs the preparation of briefing material and program documentation required by higher authority.
- Initiates and maintains scientific liaison and coordination with other governmental and non-governmental organizations with the purpose of achieving program coordination, avoiding duplication and exploiting existing R&D capabilities to meet Navy needs.
- Reviews and approves in-house and contract RDT&E proposals.
- Develops scientific and technical instructions and guidelines for in-house and contract research and development.
- Acts as the Scientific Program Element Manager for all RDT&E, N 6.1 through 6.4 assigned Program Elements.
- Prepares responses to Congressional inquiries and DoD-organized apportionment issues on research program content and funding levels.
- Formulates scientific and technical management recommendations for the Commanding Officer.

**Special Assistants to the Director**

**Assistant for Lab Animal Medicine (04C)**

- Serves as principal assistant to the Director of Research and Development on all laboratory animal medicine issues and the use of laboratory animals in research.

**Assistant for Human Use (04D)**

- Serves as principal assistant to the Director of Research and Development on all issues related to the use of humans in research activities.

**Assistant for Army Liaison (04E)**

- Serves as the liaison officer to the U. S. Army (USA) Medical Research and Development Command and is responsible for integrating the Navy scientific program areas where the USA serves as executive agent for DoD (Infectious Disease, Chemical and Biological Warfare Defense, and Combat Dentistry.)

**Deputy Director for Research and Development (04B)**

- Serves as the Deputy to the Director of Research and Development in the near-term planning, coordination, execution, and analysis of Command RDT&E programs; and for the establishment of new programs. Participates fully in the maintenance of the Command Strategic Plan.
- Assumes the duties of the Director of Research and Development in the absence of that official.

**Operational Medicine Division (41)**

**Division Director (41)**

- Directs the planning and administration of research and development efforts involving operational medicine areas.

**Management Analyst (41A)**

- Provides program and administrative support to the Operational Medicine Division.

**Research Area Manager, Submarine and Diving Medicine (411)**

- Coordinates the planning and administration of research and development efforts that involve the unique medical aspects of submarine and diving operations in support of specific underwater operational goals.
- Coordinates the medical RDT&E diving and submarine program with naval requirements.
- Maintains liaison with the appropriate officials of the BUMED, CNO, Naval Sea Systems Command, ONR, Office of Naval Technology, and other activities concerned with underwater technology.
- Monitors in-house and contract programs in submarine and diving medicine, and advises laboratories on requirements and priorities.
- As an appointed DON representative, serves as an active participant in international scientific exchanges and cooperation agreements involving diving and submarine medical research and development.
- Assists the Research Area Manager for Aerospace Medicine and Human Performance (NMRDC-44) in the Joint Technology Coordinating Group (JTCG) for Human Systems Technology in the area of Environmental Physiology.

**Research Area Manager, Fleet Occupational Health (412)**

- Coordinates the planning, development, support, and administration of medical research in characterizing and evaluating occupational hazards from chemical, physical, and biological stresses in operational environments (including heat, noise, vibration, including laser produced radiation), determining human exposure limits and developing effective measures for personnel protection.
- Responsible for coordination of all phases of Navy-unique medical research in chemical warfare defense.
- Provides centralized integration and coordination of the Navy's Biological Effects of Electromagnetic Radiation Program.
- Maintains liaison with related command research programs, BUMED, ONR, subordinate laboratories and other government department and agencies.
- Monitors in-house and contract RDT&E programs for these areas and advises field activities on research requirements and priorities.
- Serves as the Navy representative to the JTCG for Chemical Warfare Defense for the Armed Services Biomedical Research Evaluation and Management (ASBREM) Committee.
- Assists NMRDC-44 in the JTCG for Human Systems Technology Coordinating Group for Human System Technology in the areas of Non-ionizing Radiation Bioeffects and Chemical Toxicology.

**Research Area Manager, Aerospace Medicine and Human Performance (413)**

- Coordinates planning and administration of life science research and development on human performance effectiveness in operational systems and environments of the naval service, including: work on the measurement and prediction of human performance under operational stresses (e.g., motion, sustained operations, thermal, noise, acceleration/impact, heavy workloads, etc.) of naval systems from which to develop human factors criteria for medical selection, training, engineering, work procedures; and performance maintenance/enhancement; work on the behavioral and psychological dimensions of health and safety under operations and stressful duties of naval service from which to develop criteria for medical screening and safety standards; and biomedical/biomechanical intervention techniques to maintain and/or enhance mental and physical performance in adverse operational settings.
- Maintains technical liaison with; CNO, BUMED, ONR, NMPC, Naval System Command, as well as those of the Departments of the Army and Air Force, and other government agencies, for matters pertaining to aerospace medicine and human performance.

- Coordinates the planning, development, and administration of RDT&E projects in the multiple fields and disciplines associated with aviation medicine and human performance.
- Monitors in-house and contract aviation medicine and human performance R&D programs and keeps performing organization advised as to requirements and priorities.

#### Research Management Division (42)

##### Division Director (42)

- Prepares major financial/ program documentation including annual inputs to the Program Objectives Memorandum (POM) and Six Year Defense Plan (SYDP) processes, the annual Budget and Apportionment Reviews, the Claimant Program Proposal, the Block Program Plan, and the Congressional RDT&E Descriptive Summaries. Assists in the preparation, and manages the recording of changes, of budgetary allocations to individual program efforts.
- Formulates options and recommendations on overall RDT&E program objectives, policies, and scope/direction for strengthening existing programs; recommends approval/disapproval of individual in-house and contract proposals and the allocation of funds to competing projects. Directly manages the NMRDC Independent Research Program and the unique processes associated with this program.
- Develops and implements procedures for, and oversees the operation of, the review of program progress including the use of in-house reviews, outside Scientific Peer Review Panels, and specific program consultant reviews.
- Organizes, provides guidance/direction, and coordinates the development and presentation for competitive funding of major new research program initiatives (such as Accelerated Research Initiatives and Advanced Technology Demonstrations) in biomedical areas.
- Serves as the Associate Technology Base Manager and as the Associate Block Program Manager for the Medical CBR Defense and Biomedical Technology Programs. Acts as a primary spokesperson and representative of NMRDC programs to Navy and DoD R&D communities.

##### Research Administrator (421)

- Records, routes, tracks, numbers, files, and sets internal procedures for DD 1498's.
- Maintains and disseminates information on current DTIC policies and procedures, submits DD 1498's to DTIC, and searches DTIC databases.
- Administers NMRDC publication library and Quarterly Listing/Mailing systems.
- Prepares/coordinates preparation of NMRDC program documentation.
- Facilitates technology transfer.

##### Secretary to Research Management Division Director (42S)

- Receives visitors/telephone calls and incoming Code 04 correspondence.
- Prepares correspondence and NMRDC program documents/reports.
- Uses automated data processing equipment to generate financial plans and presentation graphics.
- Maintains files and provides administrative support to NMRDC Code 04.

#### Infectious Disease Division (43)

##### Division Director (43)

- Coordinates with the Research Area Manager, US Army Liaison (NMRDC-46) for the planning, development and administration of RDT&E directed toward the epidemiology, immunology, rapid diagnosis, treatment, vaccine development and control of infectious diseases of military importance.
- Maintains liaison with BUMED, Navy Environmental Health Center, Marine Corps, the Uniformed Services University of the Health Sciences, ONR, Office of Naval Technology, the Armed Forces Epidemiological Board, the Armed Forces Pest Management Board, and the National Institute of Allergy and Infectious Diseases.
- Monitors the in-house and contract infectious diseases RDT&E program and keeps performing organizations advised as to requirements and priorities.
- Serves as Navy representative on selected U.S. Navy, tri-service, and international committees, as appointed, to coordinate R&D in the thrust areas of aviation medicine and human performance research.
- Serves as the Navy representative on JTCG for Human System Technology for ASBREM committee to coordinate joint service issues in RDT&E in the six areas of: Mechanical Force/Biodynamics, Non-ionizing Radiation Bioeffects, Personal Protective Equipment Technology, Operational Medicine/Performance, Chemical Toxicology, and Environmental Physiology.

##### Oral Health Program Manager (431)

- Reports to the Director of Research and Development (Code 04). Develops research sponsorship, research requirements, provides guidance to our performers, and documents and briefs required, to our customers.

- Collaborates with the performing activities to evolve a research program which is scientifically excellent, responsive to Navy needs and requirements, and which is executable and viable in the evolving political and economic environment.
- Ensures programs are coordinated across the various funding sources and performers.

**Counsel for Intellectual Property (44)**

**Counsel for Intellectual Property (44)**

- Serves as an Attorney within a component office of the Office of the General Counsel of the Navy and as the principal advisor to the Director of Research and Development for matters related to intellectual property and cooperative agreements with other governmental and commercial organizations.

**Secretary to Counsel for Intellectual Property (44S)**

- Provides Administrative support to the Counsel for Intellectual Property.

**Combat Casualty Care Division (45)**

**Division Director (45)**

- Coordinates the planning, development and administration of RDT&E efforts directed toward improved treatment and care of casualties in combat environments.
- Monitors in-house and contract RDT&E requirements and priorities.
- Maintains liaison with the appropriate organizational codes of BUMED, ONR, Naval Sea System Command, Marine Corps, laboratories under the control of the Space and Naval Warfare Systems Command, Army Medical Research and Development Command, the Air Force Aerospace Medical Division, National Institutes of Health and other government agencies to facilitate management and execution of research area responsibilities.
- Serves as the Navy representative on JTCG for Combat Casualty Care for ASBREM committee to coordinate RDT&E in the thrust areas of: burns and trauma, shock and sepsis, blood and blood substitutes, combat care in extreme environments, and combat medical material.
- Serves as an appointed U.S. Navy representative as U.S. Project Officer for Annex No. MWDDBA-N-71-G-4209 "Blood Research" of Defense Development Exchange Program in DoD and Armed Services Blood Program Office.

**Management Analyst (45A)**

- Provides program and administrative support to the Division Director and Assistant Research Area Managers for the Combat Casualty Care Division.

**Assistant Research Area Manager, Combat Casualty Care (451)**

- Coordinates the planning, development and administration of RDT&E efforts directed toward improved treatment and prevention of disease and emergencies, and the care of combat casualties.
- Assists in the management and oversight of Combat Casualty Care Research Programs.
- Assumes cognizance over Combat Casualty Care Program matter when the Research Area Manager is absent from the Command.

**Assistant Research Area Manager, Combat Casualty Care (452)**

- Coordinates the planning, development and administration of RDT&E efforts directed toward improved treatment and prevention of disease and emergencies, and the care of combat casualties.
- Assists in the management and oversight of Combat Casualty Care Research Programs.